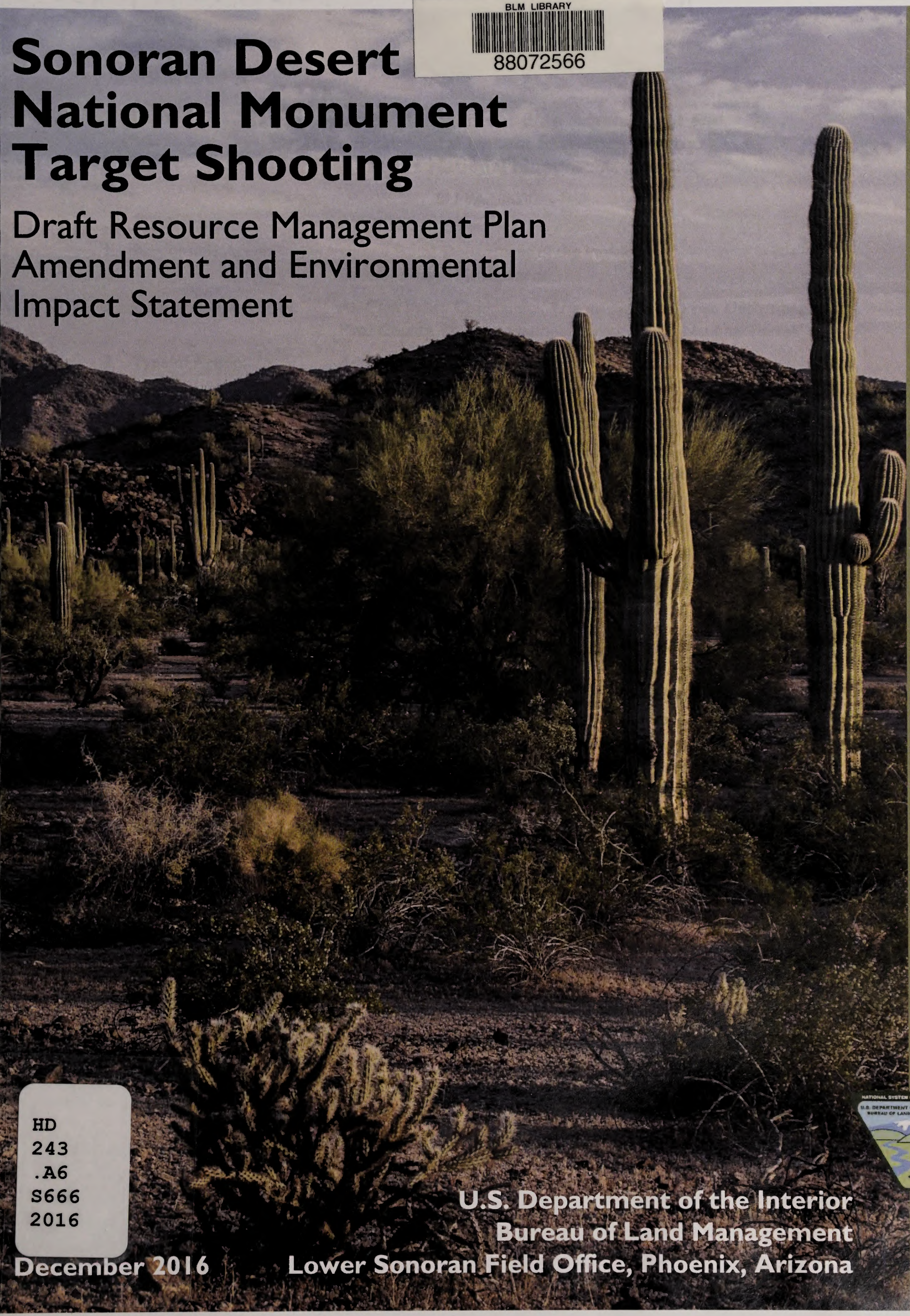
BLM LIBRARY
88072566

Sonoran Desert National Monument Target Shooting

Draft Resource Management Plan Amendment and Environmental Impact Statement

BLM



HD
243
.A6
S666
2016

December 2016

U.S. Department of the Interior
Bureau of Land Management
Lower Sonoran Field Office, Phoenix, Arizona

BLM Library
Denver Federal Center
Bldg. 50, OC-521
P.O. Box 25047
Denver, CO 80225

OCLC# 971499122 ID#: 8807 2566

HD
243
.A6
SC66
2016

Draft Resource Management Plan Amendment and Draft Environmental Impact Statement for the Sonoran Desert National Monument, Arizona

BLM/AZ/P030

1. Responsible Agency: United States Department of the Interior
   Bureau of Land Management
2. Cooperating Agencies: Ak-Chin Indian Community, Arizona Game and Fish Department, Pinal County, Prescott National Forest, Tonto National Forest
3. Type of Action: Administrative (X) Legislative ( )
4. Document Status: Draft (X) Final ( )
5. Abstract: This Draft Resource Management Plan Amendment and Environmental Impact Statement describes and analyzes five alternatives for managing recreational target shooting on the 486,400 surface acres in the Sonoran Desert National Monument (SDNM) administered by the Bureau of Land Management (BLM). The SDNM spans portions of Maricopa and Pinal Counties. The plan alternatives are:

   - Alternative A - the "no action" alternative or continuation of the 1988 Lower Gila South Resource Management Plan (target shooting allowed anywhere within the SDNM, or "no restrictions on target shooting")
   - Alternative B - the current temporary restriction on recreational target shooting would become permanent
   - Alternative C – the agency preferred alternative, recreational target shooting would be available in the Desert Back Country Recreation Management Zone
   - Alternative D - recreational target shooting would be available outside of designated wilderness, lands managed to protect wilderness characteristics, and the Juan Bautista de Anza National Historic Trail Recreation Management Zone
   - Alternative E - recreational target shooting would be restricted in all areas of the SDNM

   Alternative C is the BLM's current preferred alternative. Alternative C is not a final agency decision but instead an indication of the agency's preliminary preference that reflects the best combination of decisions to achieve the BLM's goals and policies, meet the purpose and need, protect Monument objects, address the key planning issues, and consider the recommendations of cooperating agencies and BLM specialists.
6. Review Period: The review period on the Sonoran Desert National Monument Draft Resource Management Plan Amendment and Draft Environmental Impact Statement is 90 calendar days. Comments must be received by March 15, 2017.
7. For further information, contact:

   Mr. Wayne Monger
   21605 North 7th Ave
   Phoenix, AZ 85027
   Phone: 623-580-5683
   Email: blm_az_sdnmtargetshooting@blm.gov
   Website: http://1.usa.gov/1ZPyFSA

This page intentionally left blank.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Sonoran Desert National Monument
21605 North 7th Ave
Phoenix, AZ 85027
http://www.blm.gov/az

TAKE PRIDE IN AMERICA

In Reply Refer To
1610 (AZP030)

December 16, 2016

Dear Reader:

Attached for your review and comment is the Draft Resource Management Plan Amendment/Draft Environmental Impact Statement (Draft RMPA/EIS) for the Arizona Bureau of Land Management (BLM) Sonoran Desert National Monument (SDNM). The BLM prepared this document in consultation with cooperating agencies and in accordance with the National Environmental Policy Act of 1969, as amended; the Federal Land Policy and Management Act of 1976, as amended; implementing regulations; the BLM's Land Use Planning Handbook (H-1601-1); and other applicable laws and policies.

This Draft RMPA/EIS has been prepared to address recreational target shooting within the boundaries of the SDNM as a result of a US District Court order (*National Trust for Historic Preservation, et al., Plaintiffs, v. Raymond Suazo, et al., Defendants; case 2:13-cv-01973-PHX-DGC*). Through this RMPA and through consideration of impacts on Monument objects, resources, and public safety concerns, the BLM will determine areas available and/or not available for recreational target shooting in the SDNM. This amendment will focus only on recreation management decisions for recreational target shooting and the resources and uses affected by that activity.

The planning area consists of 496,400 acres of land comprising the SDNM, which includes about 486,400 surface acres and 461,000 acres of federal mineral estate managed by the BLM. The SDNM spans portions of Maricopa and Pinal Counties. When approved, this RMPA will amend the 2012 SDNM RMP. The SDNM Draft RMPA/EIS and supporting information is available on the project website at http://1.usa.gov/1ZPyFSA.

The BLM encourages the public to provide information and comments pertaining to the analysis presented in the Draft RMPA/EIS. Comments will be most useful if they are specific, mention particular pages of the document where appropriate, and address one or more of the following:

- They identify inaccuracies or discrepancies in information
- They identify new information that would have a bearing on the analysis
- They identify new impacts, alternatives, or mitigation measures
- They make suggestions for improving management direction

Comments containing only opinion or preferences will be considered and included as part of the decision making process, although they will not receive a formal response from the BLM.

In developing the Proposed RMPA/Final EIS, which is the next phase of the planning process, the decision maker may select various management decisions from each of the alternatives analyzed in the Draft RMPA/EIS for the purpose of creating a management strategy that best meets the needs of the resources

and values in this area under the BLM multiple use and sustained yield mandate. As a member of the public, your timely comments on the SDNM Draft RMPA/EIS will help formulate the Proposed RMPA/Final EIS. Comments will be accepted for ninety (90) calendar days following the Environmental Protection Agency's publication of its Notice of Availability in the *Federal Register*. The BLM can best utilize your comments and resource information submissions if received within the review period.

Comments may be submitted electronically to blm_az_sdnmtargetshooting@blm.gov or on the project website at http://1.usa.gov/1ZPyFSA. Comments may also be submitted by mail to:

RMPA Comments
Bureau of Land Management
Sonoran Desert National Monument
81506 North 7th Ave
Phoenix, AZ 85027

Before including your address, phone number, email address, or other personal identifying information in your comment, be advised that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Public meetings to provide an overview of the document, respond to questions, and take public comments will be announced by local media, website, and/or public mailings at least 15 days in advance. Public meetings will be held at a time and date to be determined.

Copies of the Draft RMPA/EIS have been sent to affected federal, state, and local government agencies, and tribal governments. Copies are also available for public inspection at the following BLM locations:

Bureau of Land Management
Arizona State Office
One North Central Ave
Phoenix, AZ 85004

Bureau of Land Management
Phoenix District Office
21605 North 7th Ave
Phoenix, AZ 85027

Thank you for your continued interest in the SDNM RMPA. We appreciate the information and suggestions you contribute to the planning process. For additional information or clarification regarding this document or the planning process, please contact Wayne Monger at (623) 580-5683.

Sincerely,

Leon Thomas,
District Manager

TABLE OF CONTENTS

Chapter Page

ES. EXECUTIVE SUMMARY ES-1

ES.1 Introduction ES-1
ES.2 Purpose of and Need for the Resource Management Plan Amendment ES-2
ES.3 Scoping ES-2
ES.4 Issues ES-5
ES.5 Planning Criteria ES-6
ES.6 Management Alternatives ES-6
ES.6.1 Alternative A: No Action Alternative - All Areas Available to Target Shooting ES-7
ES.6.2 Alternative B: Temporary Restriction on Target Shooting Becomes Permanent ES-8
ES.6.3 Alternative C (Agency Preferred Alternative): Target Shooting Available in the Desert Back Country Recreation Management Zone ES-8
ES.6.4 Alternative D: Target Shooting Available Outside Designated Wilderness, Lands Managed to Protect Wilderness Characteristics, and the Juan Bautista de Anza National Historic Trail RMZ ES-8
ES.6.5 Alternative E: Target Shooting Restricted in All Areas ES-8
ES.7 Environmental Consequences ES-8

1. INTRODUCTION 1-1

1.1 Introduction 1-1
1.2 Purpose and Need 1-2
1.2.1 Purpose 1-2
1.2.2 Need 1-3
1.3 Description of the Planning and Decision Areas 1-3
1.3.1 Planning Area 1-3
1.3.2 Decision Area 1-6
1.4 Planning Process 1-6
1.4.1 Cooperating Agencies and Consulting Parties 1-6
1.4.2 Tribal Consultation 1-7
1.5 Public Scoping 1-7
1.5.1 Results of Scoping 1-7
1.5.2 Planning Issues 1-8
1.5.3 Issues Addressed Through Policy, Regulation, or Administrative Actions 1-15
1.5.4 Issues Beyond the Scope of the RMPA/EIS 1-15
1.6 Planning Criteria 1-17
1.6.1 Legislative Constraints 1-17
1.6.2 Relationship to Other State and Local Plans 1-18
1.6.3 Relationship to Other Federal Laws, Regulations, Policies, and Programs 1-19
1.6.4 Recreation Management Specific Laws, Regulations, and Policies 1-22

2. ALTERNATIVES 2-1

2.1 Introduction 2-1
2.2 Alternatives Development 2-1
2.2.1 Brief Description of Alternatives 2-2
2.2.2 Common to All Alternatives 2-2
2.2.3 Alternative A: No Action Alternative - All Areas Available to Target Shooting 2-7
2.2.4 Alternative B: Temporary Restriction on Target Shooting Becomes Permanent 2-9
2.2.5 Alternative C (Agency Preferred): Target Shooting Available in the Desert Back Country Recreation Management Zone 2-11
2.2.6 Alternative D: Target Shooting Available Outside Designated Wilderness, Lands Managed to Protect Wilderness Characteristics, and the Juan Bautista de Anza NHT RMZ 2-14
2.2.7 Alternative E: Target Shooting Restricted in All Areas 2-17
2.2.8 Comparison of Available vs. Restricted Areas within the Decision Area 2-19
2.2.9 Alternatives Considered but Eliminated from Further Study 2-19
2.3 Summary Comparison of Environmental Consequences 2-19

3. AFFECTED ENVIRONMENT 3-1

3.1 Introduction 3-1
3.2 Resources 3-2
3.2.1 Air Quality 3-2
3.2.2 Cultural and Heritage Resources 3-5
3.2.3 Priority Wildlife Species and Habitat 3-8
3.2.4 Soil Resources 3-18
3.2.5 Vegetation Resources 3-24
3.2.6 Water Resources 3-31
3.2.7 Lands with Wilderness Characteristics 3-32
3.2.8 Wildfire Management 3-35
3.3 Resource Uses 3-43
3.3.1 Livestock Grazing 3-43
3.3.2 Recreation Management 3-46
3.3.3 Recreational Target Shooting 3-55
3.3.4 Travel Management 3-57
3.4 Special Designations 3-63
3.4.1 National Conservation Lands 3-63
3.4.2 Congressional Designations 3-67
3.5 Social and Economic Conditions 3-71
3.5.1 Tribal Interests 3-71
3.5.2 Hazardous Materials and Public Safety 3-72
3.5.3 Socioeconomics and Environmental Justice 3-74

4. ENVIRONMENTAL CONSEQUENCES 4-1

4.1 Introduction 4-1
4.1.1 Analytical Assumptions 4-2
4.1.2 Types of Effects to be Addressed 4-3
4.1.3 Incomplete or Unavailable Information 4-5

4.2 Resources 4-6
4.2.1 Air Quality 4-6
4.2.2 Cultural and Heritage Resources 4-10
4.2.3 Priority Wildlife Species and Habitat 4-19
4.2.4 Soil Resources 4-36
4.2.5 Vegetation 4-44
4.2.6 Water Resources 4-57
4.2.7 Lands with Wilderness Characteristics 4-64
4.2.8 Wildfire Management 4-71
4.3 Resource Uses 4-76
4.3.1 Livestock Grazing 4-76
4.3.2 Recreation Management 4-83
4.3.3 Recreational Target Shooting 4-93
4.3.4 Travel Management 4-97
4.4 Special Designations 4-102
4.4.1 National Conservation Lands 4-102
4.4.2 Congressional Designations 4-103
4.5 Social and Economic 4-120
4.5.1 Tribal Interests 4-120
4.5.2 Hazardous Materials and Public Safety 4-127
4.5.3 Social and Economic Conditions and Environmental Justice 4-131
4.6 Unavoidable Adverse Impacts 4-142
4.7 Irreversible and Irretrievable Commitment of Resources 4-143
4.8 Relationship Between Local Short-term Uses and Long-term Productivity 4-144

5. CUMULATIVE EFFECTS 5-1

5.1 Introduction 5-1
5.1.1 Cumulative Analysis Methodology 5-1
5.1.2 Past, Present, and Reasonably Foreseeable Future Actions 5-6
5.2 Resources 5-9
5.2.1 Air Quality 5-9
5.2.2 Cultural and Heritage Resources 5-12
5.2.3 Priority Wildlife Species and Habitat 5-17
5.2.4 Soil Resources 5-24
5.2.5 Vegetation 5-27
5.2.6 Water Resources 5-31
5.2.7 Lands with Wilderness Characteristics 5-33
5.2.8 Wildfire Management 5-35
5.3 Resource Uses 5-42
5.3.1 Livestock Grazing 5-42
5.3.2 Recreation Management 5-43
5.3.3 Recreational Target Shooting 5-50
5.3.4 Travel Management 5-54
5.4 Special Designations 5-56
5.4.1 National Conservation Lands 5-56
5.4.2 Congressional Designations 5-57
5.5 Social and Economic 5-65
5.5.1 Tribal Interests 5-65
5.5.2 Hazardous Materials and Public Safety 5-71
5.5.3 Social and Economic Conditions and Environmental Justice 5-73

6. CONSULTATION AND COORDINATION 6-1

6.1 Introduction 6-1
6.2 Public Collaboration and Outreach 6-1
6.2.1 Scoping Process 6-2
6.2.2 Alternatives Development Process 6-5
6.2.3 Project Website 6-5
6.2.4 Mailing List 6-6
6.2.5 Future Public Involvement 6-6
6.3 Consultation and Coordination 6-6
6.3.1 Native American Tribe Consultation 6-6
6.3.2 Arizona State Historic Preservation Office Consultation 6-7
6.3.3 US Fish and Wildlife Service Consultation 6-7
6.3.4 Resource Advisory Council Collaboration 6-8
6.3.5 Interest Groups 6-8
6.4 List of Preparers 6-8

REFERENCES REFERENCES-1

GLOSSARY GLOSSARY-1

INDEX INDEX-1

TABLES

Page

ES-1 Alternatives Allocation Summary ES-7
1-1 Planning Area Surface Management Responsibility/Ownership 1-3
1-2 RMPA Planning Process 1-6
2-1 Alternatives Allocation Summary 2-19
2-2 Summary of Environmental Consequences of Alternatives A, B, C, D, and E 2-20
3-1 Special Status Species and Priority Species 3-9
3-2 Vegetation Communities 3-24
3-3 Special Status Plant Species 3-27
3-4 Watersheds 3-31
3-5 Lands Managed to Protect Wilderness Characteristics 3-34
3-6 Historical Fire Regimes, Based on Fire Frequency and Severity 3-37
3-7 Current Fire Regime Condition Classes by Vegetative Community 3-39
3-8 Wildland Fires 2009-2016 3-42
3-9 Grazing Allotment Information 3-46
3-10 Visitor Use in the SDNM 3-47
3-11 Special Recreation Permits in the SDNM 3-52
3-12 OHV Travel Management Allocations 3-60
3-13 Route Designations 3-61
3-14 Sonoran Desert National Monument Objects 3-64
3-15 Special Designations in the Planning Area 3-67
3-16 Employment in Travel and Tourism in 2014 3-76
3-17 Visitor Use in the SDNM 3-78
3-18 National Forest Visitor Spending Profiles in 2003 3-78
3-19 National Average Spending per Shooter in 2011 3-79
3-20 Individuals and Families Living Below Poverty in 2014 3-82

3-21 Household Income Distribution in 2014 3-82
3-22 Poverty in 2014 for Key Communities 3-82
3-23 County-Level Population by Race/Ethnicity in 2014 3-83
3-24 Key Community Race/Ethnicity in 2014 3-83
4-1 Site Density per Alternative 4-16
4-2 Sonoran Desert Tortoise Habitats Available to Recreational Target Shooting by Alternative 4-24
4-3 Acres of Desert Bighorn Sheep Habitat Available to Recreational Target Shooting by Alternative 4-24
4-4 Acres of Mule Deer Habitat Available to Recreational Target Shooting by Alternative 4-25
4-5 Acres of Sonoran Pronghorn 10J Experimental Population Area Available to Recreational Target Shooting by Alternative 4-26
4-6 Acres of Wildlife Movement Corridors Available to Recreational Target Shooting by Alternative 4-27
4-7 Number of Wildlife Water Catchments in Areas Available to Recreational Target Shooting by Alternative 4-28
4-8 Recreational Target Shooting Availability and Sensitive Soils–Alternative A 4-39
4-9 Recreational Target Shooting Availability and Sensitive Soils–Alternative B 4-40
4-10 Recreational Target Shooting Availability and Sensitive Soils–Alternative C 4-41
4-11 Recreational Target Shooting Availability and Sensitive Soils–Alternative D 4-43
4-12 Recreational Target Shooting Availability and Sensitive Soils–Alternative E 4-44
4-13 Vegetation Communities Overlapping Target Shooting Allocations by Alternative 4-49
4-14 Acuña Cactus Critical Habitat Overlapping Target Shooting Allocations by Alternative 4-50
4-15 Recreational Target Shooting Availability and Streams– Alternative A 4-60
4-16 Recreational Target Shooting Availability and Streams– Alternative B 4-61
4-17 Recreational Target Shooting Availability and Streams– Alternative C 4-62
4-18 Recreational Target Shooting Availability and Streams– Alternative D 4-63
4-19 Recreational Target Shooting Availability and Streams– Alternative E 4-64
4-20 Lands Managed to Protect Wilderness Characteristics 4-67
4-21 Lands Found to Possess Wilderness Characteristics 4-67
4-22 Qualitative Intensity Scale – Departure of Vegetation from Reference Conditions 4-72
4-23 Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative A 4-79
4-24 Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative B 4-80
4-25 Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative C 4-81
4-26 Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative D 4-82
4-27 Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative E 4-83
4-28 Sonoran Desert National Monument Objects 4-103
4-29 Economic Impacts of Recreation in Socioeconomic Study Area Counties 4-134
4-30 Average Spending by Activity 4-134
5-1 Spatial Boundary of Cumulative Impacts Analysis 5-2
5-2 Summary of Cumulative Impacts on Priority Wildlife Species and Habitat 5-24
5-3 Sonoran Desert National Monument Objects 5-57
6-1 Public Scoping Meetings 6-5

FIGURES

		Page
ES-1	Sonoran Desert National Monument Resource Management Plan Amendment Planning Area	ES-3
ES-2	Greater Phoenix Metropolitan Area	ES-4
1-1	Sonoran Desert National Monument Surface Administration	1-4
2-1	Alternative A	2-8
2-2	Alternative B	2-10
2-3	Alternative C	2-13
2-4	Alternative D	2-16
2-5	Alternative E	2-18
3-1	Air Pollutant Nonattainment Areas	3-4
3-2	Priority Plant and Animal Species	3-12
3-3	Soil Types	3-19
3-4	Soil Wind Erosion Potential	3-23
3-5	Vegetation Communities	3-25
3-6	Fire Regime Groups	3-40
3-7	Fire Regime Condition Class	3-41
3-8	Livestock Grazing Allotments	3-45
3-9	Extensive Recreation Management Area and BLM Recreation Sites	3-51
3-10	Inventoried Recreation Impact Sites	3-54
3-11	Travel Management	3-58
5-1	Cumulative Impact Analysis Geographic Boundary for Majority of SDNM Resources	5-3
5-2	Cumulative Impact Analysis Geographic Boundary for Watershed Resources	5-4
5-3	Cumulative Impact Analysis Geographic Boundary for Livestock Grazing	5-5

APPENDICES

A	Sonoran Desert National Monument Presidential Proclamation
B	Sonoran Desert National Monument Monitoring and Mitigation Protocol

Acronyms and Abbreviations

	Full Phrase
ACEC	Area of Critical Environmental Concern
AGFD	Arizona Game and Fish Department
APA	Administrative Procedures Act
ARS	Arizona Revised Statutes
ATV	all-terrain vehicle
AUM	animal unit month
AWLW	Arizona's Wildlife Linkages Workgroup
BLM	United States, Department of the Interior, Bureau of Land Management
BMP	best management practice
CAA	Clean Air Act of 1963
CC	condition class
CEQ	Council on Environmental Quality
CERCLA	Comprehensive, Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CH4	methane
CMP	Comprehensive Management Plan
CO	carbon monoxide
CWPP	Community Wildfire Protection Plan
DOI	United States, Department of the Interior
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
EPA	Environmental Protection Agency
ERMA	Extensive Recreation Management Area
ESA	Endangered Species Act of 1973
FLPMA	Federal Land Policy and Management Act of 1976
FMU	Fire Management Units
FR	Federal Register
GHG	greenhouse gas
GIS	geographic information systems
HAPs	hazardous air pollutants
HR	House Resolution
IB	Information Bulletins
ID	Interdisciplinary Team
IM	Instruction Memorandum
LSFO	Lower Sonoran Field Office

ACRONYMS AND ABBREVIATIONS *(continued)*

	Full Phrase
MAG	Maricopa Association of Governments
MLRA	Major Land Resource Area
MOU	Memorandum of Understanding
MS	Manual Section
N2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1970
NHPA	National Historic Preservation Act of 1966
NHT	National Historic Trail
NLCS	National Landscape Conservation System
NO_2	nitrogen dioxide
NOI	Notice of Intent
NPS	United States, Department of the Interior, National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O3	ozone
OHV	off-highway vehicle
OPLMA	Omnibus Public Land Management Act of 2009
PHD	Phoenix District
PL	Public Law
PM_{10}	particulate matter with a diameter less than or equal to 10 microns
$PM_{2.5}$	particulate matter with a diameter less than or equal to 2.5 microns
RAC	Resource Advisory Council
RMP	Resource Management Plan
RMPA	Resource Management Plan Amendment
RMZ	recreation management zone
ROD	Record of Decision
ROW	right-of-way
SCS	Soil Conservation Service
SDNM	Sonoran Desert National Monument
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SOP	Standard Operating Procedure
SR	State Route
SRMA	Special Recreation Management Area
US	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

This page intentionally left blank.

Executive Summary

TABLE OF CONTENTS

Chapter Page

ES. EXECUTIVE SUMMARY ES-1

ES.1 Introduction ES-1
ES.2 Purpose of and Need for the Resource Management Plan Amendment ES-2
ES.3 Scoping ES-2
ES.4 Issues ES-5
ES.5 Planning Criteria ES-6
ES.6 Management Alternatives ES-6
ES.6.1 Alternative A: No Action Alternative - All Areas Available to Target Shooting ES-7
ES.6.2 Alternative B: Temporary Restriction on Target Shooting Becomes Permanent ES-8
ES.6.3 Alternative C (Agency Preferred Alternative): Target Shooting Available in the Desert Back Country Recreation Management Zone ES-8
ES.6.4 Alternative D: Target Shooting Available Outside Designated Wilderness, Lands Managed to Protect Wilderness Characteristics, and the Juan Bautista de Anza National Historic Trail RMZ ES-8
ES.6.5 Alternative E: Target Shooting Restricted in All Areas ES-8
ES.7 Environmental Consequences ES-8

TABLES

Page

ES-1 Alternatives Allocation Summary ES-7

FIGURES

Page

ES-1 Sonoran Desert National Monument Resource Management Plan Amendment Planning Area ES-3
ES-2 Greater Phoenix Metropolitan Area ES-4

This page intentionally left blank.

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

The United States (US) Department of the Interior (DOI), Bureau of Land Management (BLM) has prepared this draft resource management plan amendment (Draft RMPA) and draft environmental impact statement (Draft EIS) for the BLM Sonoran Desert National Monument (SDMN) in accordance with the National Environmental Policy Act of 1969 (NEPA); Council on Environmental Quality regulations for implementing NEPA (40 Code of Federal Regulations [CFR], Parts 1500-1508); BLM NEPA regulations (43 CFR, Part 46); the Federal Land Policy and Management Act (FLPMA) of 1976 (43 US Code [USC], Sections 1701 et seq.); requirements of the BLM's NEPA Handbook, H-1790-1 (BLM 2008a); and BLM's Land Use Planning Handbook, H-1601-1 (BLM 2005a).

This RMPA/EIS has been prepared to address recreational target shooting on BLM administered lands within the boundaries of SDNM. The decisions related to management of recreational target shooting in the 2012 SDNM Resource Management Plan (RMP)/Final EIS and Record of Decision (ROD) were deemed inadequate, vacated, and remanded back to the BLM for reconsideration by a March 27, 2015, US District Court - District of Arizona ruling. Through this RMPA/EIS, the BLM will address areas available for recreational target shooting, if any, and associated management prescriptions, public safety concerns, cultural and natural resource protection, and potential impacts on Monument objects. This RMPA/EIS is necessary due to the US District Court order referenced above. This RMPA/EIS will focus only on recreation management decisions for recreational target shooting and the resources and uses in the SDNM affected by that activity.

The approved RMPA will amend the 2012 SDNM RMP (BLM 2012) to address recreational target shooting, and it will guide management of public lands

administered by the SDNM into the future. Information about the RMPA/EIS process can be obtained on the project website at http://1.usa.gov/1ZPyFSA.

The SDNM planning area is composed of the 496,400 acres of BLM-administered, State of Arizona, and privately owned land in the SDNM. A map of the planning area is provided in **Figure ES-1**, Sonoran Desert National Monument Resource Management Plan Amendment Planning Area. A map of the surrounding vicinity is shown in **Figure ES-2**, RMPA Vicinity.

The decision area for the RMPA—those lands on which the RMPA will make decisions—is composed only of SDNM BLM-administered lands within the larger planning area. While the planning area encompasses approximately 496,400 acres spanning two counties and areas of State and private land, BLM management applies only to public lands, meaning those lands where the BLM has management responsibility for either the surface or the subsurface estate. Therefore, the decision area encompasses 486,400 surface acres of public lands and 461,000 acres of subsurface land.

ES.2 Purpose of and Need for the Resource Management Plan Amendment

The purpose of the RMPA is to establish appropriate goals and objectives, and to provide management guidance for recreational target shooting on public land within the SDNM while also ensuring that actions are consistent with the Monument proclamation.

The need for this planning effort is to address management of recreational target shooting in the SDNM, because the 2012 ROD and associated analysis (BLM 2012) were vacated. Because the US District Court vacated the 2012 ROD and EIS, the portions of those documents addressing recreational target shooting no longer exist, and the most recent SDNM RMP does not address recreational target shooting.

ES.3 Scoping

The formal scoping period began with publication of the Notice of Intent (NOI) in the *Federal Register* on January 21, 2016. The NOI was provided for public consideration at three (3) scoping open houses and was posted at https://federalregister.gov/a/2016-01187. The scoping period for receipt of public comments ended March 21, 2016. Notice of the proposed RMPA/EIS was posted on the NEPA Register (ePlanning) and project website on January 21, 2016.

On January 22, 2016, a press release was issued notifying the public that the NOI was published and indicating the start of the public comment period. On February 2, 2016, a press release was issued announcing the times and locations of the public scoping meetings.

Figure ES-1
Sonoran Desert National Monument
Resource Management Plan
Amendment Planning Area

- Bureau of Land Management (BLM)
- Designated Wilderness Area
- Tribal Lands
- Private
- Barry M. Goldwater Air Force Range
- State
- Local or State Parks
- State Wildlife Area
- Bureau of Reclamation
- Sonoran Desert National Monument Boundary
- Special Management Area Boundary
- Roads, Primitive Roads, and Trails

Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
North Maricopa Mountains Wilderness
Juan Bautista de Anza NHT
BLM Road 8004
238
Bosque
South Maricopa Mountains Wilderness
Maricopa County
Pinal County
347
Stanfield
84
Big Horn
8
Freeman
Area A Special Management Area
Table Top Wilderness
Vekol Valley Road

ARIZONA
Phoenix
Tucson
Map Location

Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_ES_SurfaceAdmin_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 5 10
Miles

Figure ES-2
Greater Phoenix Metropolitan Area

Greater Phoenix Metropolitan Area
Sonoran Desert National Monument Boundary

Mohave County
La Paz County
Yavapai County
Coconino County
Navajo County
Gila County
Yuma County
Maricopa County
Pinal County
Pima County
Cochise County
Santa Cruz County
MEXICO

Peoria
Glendale
Scottsdale
Phoenix
Goodyear
Buckeye
Tempe
Mesa
Gilbert
Chandler
Mobile
Maricopa
Gila Bend
Ajo
Tucson

Juan Bautista de Anza NHT

93 89 17 60 87 10 347 70 238 8 85 77 19

Map Location
ARIZONA
Phoenix
Tucson

Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
December 06, 2016
SonoranRMPA_ES_PhoenixMetro_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 25 50
Miles

The BLM Arizona reached out to Tread Lightly!; the US Forest Service; Federal Lands Hunting, Fishing and Shooting Sports Roundtable; the Wildlife and Hunting Heritage Conservation Council (WHHCC); and other partners in the Sonoran Landscape Project ensuring they understood the BLM's next steps and ensuring their stakeholders received factual information.

Approximately 910 postcards were mailed and an additional 1,387 were emailed to interested parties in January 2016. The postcard informed the recipients of the scoping meetings and purpose, as well as the dates and locations. Recipients included congressional representatives; state and local government officials and agencies; tribal leadership; national, state, and local organizations; local business owners; private landowners; and interested individuals. The BLM compiled the mailing list from individuals, agencies, and organizations that have participated in past BLM projects; those requesting to be on the mailing list; and those who have an interest. The BLM provided instructions on how to provide valuable and meaningful comment.

The scoping process included discussions and reviews from the Interdisciplinary (ID) Team, meetings with the consulting parties and cooperating agencies, three public open houses, development of a website (http://1.usa.gov/1ZPyFSA), and an invitation for the public to provide written comments. The BLM provided the local media with press releases announcing the time, location, and purpose of these meetings.

The scoping period for receipt of public comments ended March 21, 2016. The BLM received 376 total comments, with 113 coded as opinion only. The remaining 263 scoping comments were coded into subject categories, as described below. Detailed information about the comments received and about the public outreach process can be found in the Sonoran Desert RMPA Scoping Summary Report, finalized in July 2016 (BLM 2016). A summary of the issues identified during public scoping and outreach is included in **Section ES.4**, Issues, below.

ES.4 Issues

The BLM received 376 scoping comments. All scoping comments were read and reviewed. Of the 376 total comments received, 113 were coded as opinion only and did not contain a specific theme. The remaining 263 scoping comments were entered into a tracking spreadsheet and organized by the following categories:

- Presidential Proclamation/Monument Objects
- Public Safety
- Socioeconomic
- Partnerships, Outreach, and Education
- Impacts on Natural Resources, Habitat, and Its Uses

- Impacts on Cultural Resources and Historic Properties
- Noise
- Hazardous Materials and Illegal Dumping
- Enforcement, Application of Supplementary Rules, and Mitigation
- Scientific Data and Analysis
- Zoned Areas and Limitations of Accessibility/Alternate Areas
- Cumulative Impacts

ES.5 Planning Criteria

Planning criteria guide development of the RMPA/EIS by defining the decision space. 40 CFR, Subparts 1610.4-2(b) states that the "Planning criteria will generally be based upon applicable law, Director and State Director guidance, the results of public participation, and coordination with any cooperating agencies and other Federal agencies, State and local governments, and federally recognized Indian tribes." Planning criteria represent the overarching factors used to resolve issues and develop alternatives. The planning criteria considered in the development of this document are as follows:

- The RMPA/EIS addresses BLM-administered lands only
- The RMPA/EIS makes land use planning decisions specific to potential closure or restrictions of recreational target shooting to determine the desired future condition and uses of these BLM-administered lands
- The RMPA/EIS utilizes a collaborative and multi-jurisdictional approach to determine the desired future condition of public lands
- The RMPA/EIS complies with NEPA, FLPMA, and other applicable laws, executive orders, regulations, and policy
- The RMPA/EIS recognizes valid existing rights
- The RMPA/EIS does not change existing planning decisions that are still valid

ES.6 Management Alternatives

The BLM used several sources of input to formulate alternatives. The BLM published an NOI in the *Federal Register* announcing the EIS and initiating scoping. Public scoping occurred from January 21, 2016, to March 21, 2016, which provided an opportunity for interested members of the public and local governments, as well as other resource and land management agencies, to comment on the planning process and/or management concerns. Comments received were analyzed in a series of work sessions with the ID Team, where preliminary alternatives were developed. Planning challenges identified through the BLM's preplanning and public scoping efforts helped the ID Team identify

key planning issues to be addressed in the Draft RMPA/EIS. Based on internal and external scoping, the BLM identified and developed five alternatives.

Under all alternatives, anyone engaging in recreational activities within the SDNM must comply with all standard operating procedures and administrative actions described in the Recreation Management section and Appendix D of the 2012 RMP, as adopted in the ROD, applicable laws, regulations, and policies (see **Section 2.2.2** for a full list of standard operating procedures for recreational target shooting from the 2012 RMP).

Table ES-1, below, shows a comparison of acreage across all alternatives where recreational target shooting would be available or restricted.

Table ES-1
Alternatives Allocation Summary

Alternative	Acres Available for Recreational Target Shooting	Acres Where Recreational Target Shooting Would be Restricted
Alternative A: No Action Alternative – All Areas Available for Target Shooting	486,400	0 acres
Alternative B: Temporary Restriction on Target Shooting Becomes Permanent	476,300	10,100
Alternative C: Target Shooting Available in the Desert Back Country RMZ	433,600	52,800
Alternative D: Target Shooting Available Outside Designated Wilderness, Lands Managed to Protect Wilderness Characteristics, and the Juan Bautista de Anza NHT RMZ	166,500	319,900
Alternative E: Target Shooting Restricted in All Areas	0 acres	486,400

Source: BLM GIS 2016

ES.6.1 Alternative A: No Action Alternative - All Areas Available to Target Shooting

The recreational target shooting decisions in the 2012 ROD were vacated by the US District Court of Arizona in March 2015. Under Alternative A, no action would be taken to manage recreational target shooting. Because the recreational target shooting decisions in the Lower Gala RMP of 1988 (BLM 1988), as amended, are still in effect, the No Action Alternative results in no restriction with respect to recreational target shooting within the entire Monument on BLM-administered lands (486,400 acres; see **Figure 2-1**, Alternative A).

ES.6.2 Alternative B: Temporary Restriction on Target Shooting Becomes Permanent

Under Alternative B, the area that is temporarily closed (i.e., restricted) under the 2015 court order (approximately 10,100 acres of the decision area; see **Figure 2-2**, Alternative B) would become permanently restricted to recreational target shooting. The restriction area is on the north side of the SDNM along the El Paso Natural Gas Pipeline right-of-way (ROW) that parallels BLM Road 8000. It also extends along both sides of BLM Road 8001, adjacent to the wilderness boundary, before terminating at BLM Road 8006.

ES.6.3 Alternative C (Agency Preferred Alternative): Target Shooting Available in the Desert Back Country Recreation Management Zone

Alternative C, the agency preferred alternative, protects Monument objects and public safety by restricting recreational target shooting in the Juan Bautista de Anza NHT Recreation Management Zone (RMZ) while continuing to make recreational target shooting available in areas where it is compatible with existing SDNM RMP recreation management and objectives. Under Alternative C, recreational target shooting would be available in the Desert Back Country RMZ (approximately 433,600 acres; see **Figure 2-3**, Alternative C). The Desert Back Country RMZ has been identified in the RMP to "provide recreation opportunities for visitors seeking a remote, undeveloped, back country experience with resource-dependent activities such as hunting, camping, hiking, sightseeing, and four-wheel-drive touring" (BLM 2012).

ES.6.4 Alternative D: Target Shooting Available Outside Designated Wilderness, Lands Managed to Protect Wilderness Characteristics, and the Juan Bautista de Anza National Historic Trail RMZ

Under Alternative D, the Juan Bautista de Anza National Historic Trail (NHT) RMZ, three designated wilderness units, and lands managed to protect wilderness characteristics would restrict recreational target shooting (approximately 319,900 acres; see **Figure 2-4**, Alternative D).

ES.6.5 Alternative E: Target Shooting Restricted in All Areas

Under Alternative E, recreational target shooting would be restricted in the entire decision area (approximately 486,400 acres; see **Figure 2-5**, Alternative E).

ES.7 Environmental Consequences

The purpose of the environmental consequences analysis in this RMPA/EIS is to determine the potential for significant impacts of the federal action related to recreational target shooting on the human environment. Council on Environmental Quality regulations for implementing NEPA state that the "human environment" is interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment (40 CFR, Part 1508.14). The "federal action" is the BLM's selection of an RMPA on

which future land use actions related to recreational target shooting will be based for the SDNM.

Chapter 4 and Chapter 5 objectively evaluate the likely direct, indirect, and cumulative impacts on the human and natural environment in terms of environmental, social, and economic consequences that are projected to occur from implementing the alternatives. Some types of impacts for resources or resource uses could be confined to BLM-administered lands (such as soil disturbance), whereas some actions may have off-site/indirect impacts on resources on other land jurisdictions (e.g., private or state lands). The impact analysis identifies both enhancing and improving effects on a resource from proposed management, as well as those that have the potential to diminish resource values.

This page intentionally left blank.

Chapter 1

TABLE OF CONTENTS

Chapter Page

1. INTRODUCTION 1-1

1.1 Introduction 1-1
1.2 Purpose and Need 1-2
1.2.1 Purpose 1-2
1.2.2 Need 1-3
1.3 Description of the Planning and Decision Areas 1-3
1.3.1 Planning Area 1-3
1.3.2 Decision Area 1-6
1.4 Planning Process 1-6
1.4.1 Cooperating Agencies and Consulting Parties 1-6
1.4.2 Tribal Consultation 1-7
1.5 Public Scoping 1-7
1.5.1 Results of Scoping 1-7
1.5.2 Planning Issues 1-8
1.5.3 Issues Addressed Through Policy, Regulation, or Administrative Actions 1-15
1.5.4 Issues Beyond the Scope of the RMPA/EIS 1-15
1.6 Planning Criteria 1-17
1.6.1 Legislative Constraints 1-17
1.6.2 Relationship to Other State and Local Plans 1-18
1.6.3 Relationship to Other Federal Laws, Regulations, Policies, and Programs 1-19
1.6.4 Recreation Management Specific Laws, Regulations, and Policies 1-22

TABLES

Page

1-1 Planning Area Surface Management Responsibility/Ownership 1-3
1-2 RMPA Planning Process 1-6

FIGURES

Page

1-1 Sonoran Desert National Monument Surface Administration 1-4

This page intentionally left blank.

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

President William J. Clinton issued Presidential Proclamation 7397 on January 17, 2001 (see **Appendix A**), designating the SDNM. The Monument was created to protect an array of scientific, biological, archaeological, geological, cultural, and historic objects. These objects, both individually and collectively in the context of the natural environments that support and protect them, are referred to as "monument objects" (see **Section 3.4.2** for description of monument objects). Located within the BLM's Lower Sonoran Field Office (LSFO), the BLM is responsible for the management of public lands within the SDNM in a manner that is consistent with management guidance outlined in the proclamation. The BLM completed an RMP and ROD for the SDNM in 2012 to direct management of the area in accordance with the proclamation.

During 2013, the National Trust for Historic Preservation, the Wilderness Society, and Archaeology Southwest subsequently sued the BLM in US District Court – District of Arizona (court), claiming the BLM violated the proclamation, the Federal Land Policy and Management Act of 1976 (FLPMA), the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), and the Administrative Procedures Act (APA) in continuing to allow recreational target shooting in the SDNM (*National Trust for Historic Preservation, et al., Plaintiffs, v. Raymond Suazo, et al., Defendants; case 2:13-cv-01973-PHX-DGC*). On March 27, 2015, the court ruled that the BLM had violated FLPMA and NEPA when making its decision to allow recreational target shooting in the SDNM, but found in favor of the BLM on the plaintiffs' claim that the BLM had violated the APA (claims pertaining to the NHPA were dismissed, and the plaintiffs did not seek summary judgment on that assertion). The court vacated portions of the ROD/RMP and Final EIS that permitted recreational target shooting throughout the Monument and remanded the decision to the BLM for reconsideration. The court also ordered the BLM to ensure that the analysis of

mitigation measures and cumulative impacts in the EIS were consistent with the order.

During April 2015, the plaintiffs requested, and in July 2015, the court granted, injunctive relief and ordered the BLM to close approximately 10,100 acres (2 percent) of the decision area to recreational target shooting pending compliance with the court's earlier order of March 27, 2015. The court further ordered a deadline of September 15, 2015, to implement the closure and a deadline of September 30, 2017, to address the violations discussed above.

This RMPA/EIS has been prepared to address recreational target shooting on BLM administered lands within the boundaries of SDNM. Through this RMPA and through consideration of impacts on Monument objects, resources, and public safety concerns, the BLM will determine areas available and/or not available for recreational target shooting in the SDNM and associated management prescriptions. This RMPA/EIS will focus only on recreation management decisions for recreational target shooting and the resources and uses in the SDNM affected by that activity.

For the purposes of this planning process, "recreational target shooting" is defined as the discharge of any firearm for any lawful recreational purpose other than the lawful taking of a game animal. Recreational target shooting does not include the use of firearms in accordance with state hunting regulations and policy, and does not apply to hunters in pursuit of game with firearms that are being employed in accordance with such regulations.

1.2 Purpose and Need

FLPMA directs the BLM to manage the public lands and their various resource values for multiple use and sustained yield to ensure they are utilized in a manner that will best meet the present and future needs of the American people.

As required by the proclamation, FLPMA, and BLM policy, the BLM prepared the SDNM RMP to establish management directions for the balanced use of such renewable and nonrenewable resources as rangeland, wildlife, wilderness, recreation, cultural resources, and other natural, scenic, scientific, and historical values within the SDNM planning area, while also providing for the protection of Monument objects. As the court's order of March 27, 2015, vacated portions of the SDNM ROD, RMP, and Final EIS pertaining to recreational target shooting, an amendment to the plan is needed to establish management direction for that use.

1.2.1 Purpose

The purpose of the RMPA is to establish management guidance for recreational target shooting on public land within the SDNM, while ensuring the actions are consistent with the Monument Proclamation and existing goals and objectives in the 2012 SDNM ROD.

1.2.2 Need

The need for this planning effort is to address management of recreational target shooting in the SDNM, because the 2012 ROD and associated analysis (BLM 2012) were vacated. Because the US District Court vacated the 2012 ROD and EIS, the portions of those documents addressing recreational target shooting no longer exist, and the most recent SDNM RMP does not address recreational target shooting.

The planning decision to be made is where recreational target shooting should be available in the SDNM and how impacts related to this activity should be managed.

1.3 Description of the Planning and Decision Areas

1.3.1 Planning Area

The planning area, identified in **Figure 1-1**, covers nearly 496,400 acres of south-central Arizona and includes 440,600 acres of Maricopa County, as well as 55,800 acres of Pinal County. Population centers adjacent to the planning area include metropolitan Phoenix and the communities of Ajo, Goodyear, Buckeye, Gila Bend, Mobile, Casa Grande, and Maricopa. The planning area encompasses federal- and state-administered lands as well as private lands. In addition to the surface management responsibility and ownership displayed in **Table 1-1**, the BLM administers 461,000 acres of federal mineral estate.

Table 1-1
Planning Area Surface Management Responsibility/Ownership

Landowner/Surface Management Agency	Acres	Percent of Total
BLM	486,400	98.0
State of Arizona	3,900	0.8
Privately owned	6,100	1.2
Total	**496,400**	**100**

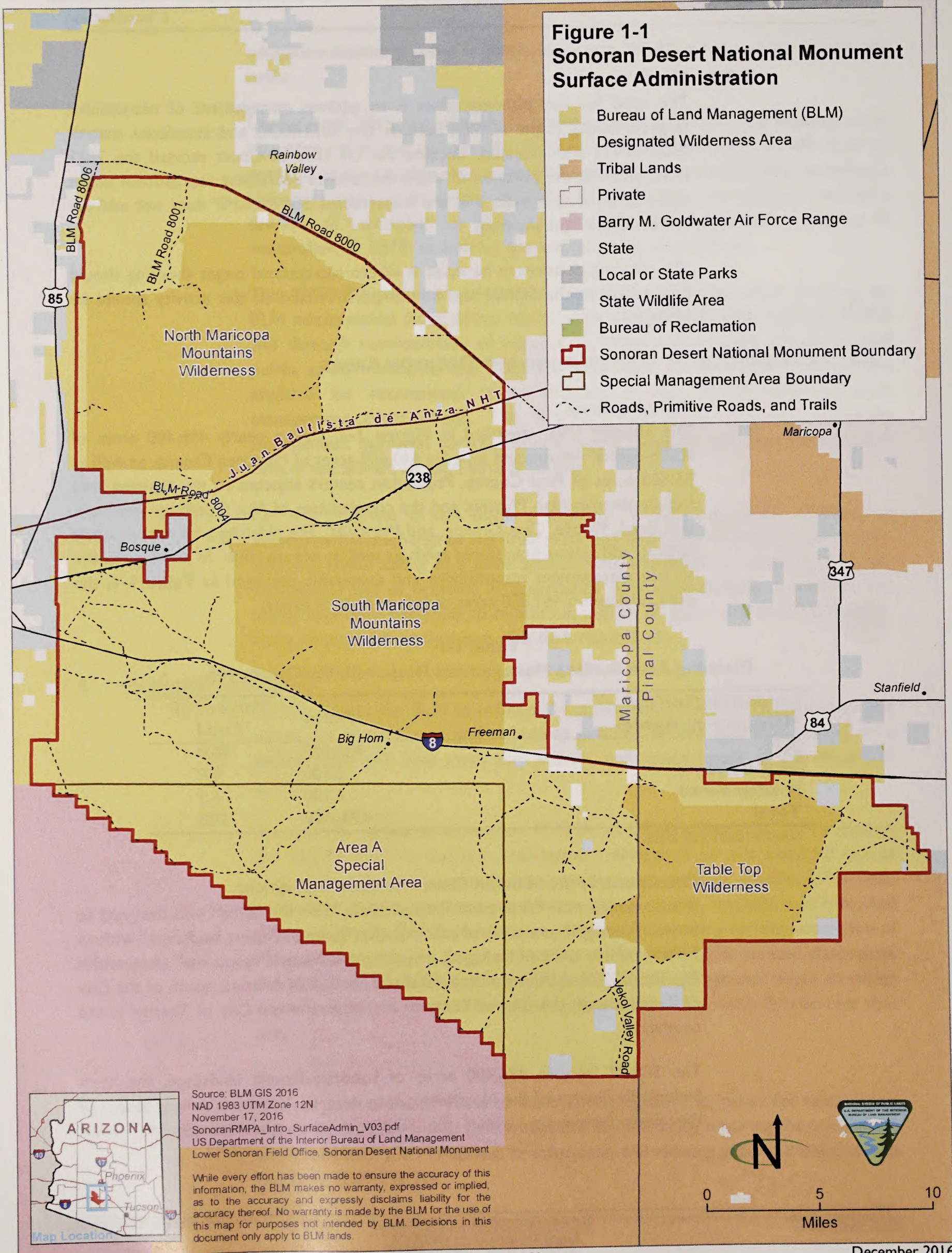
Source: BLM GIS 2016

Description of the Sonoran Desert National Monument

In accordance with Presidential Proclamation 7397, the SDNM was designed to protect "a magnificent array of untrammeled Sonoran Desert landscape" with an "extraordinary array of biological, scientific, and historic resources" (**Appendix A**). The SDNM is located in the southern portion of Arizona, south of the City of Phoenix, with the City of Yuma to the west, and the City of Tucson to the southeast.

The SDNM features 496,400 acres of Sonoran Desert landscape, the most biologically diverse of the North American deserts. The most striking aspect of the plant community within the SDNM is the extensive saguaro cactus

Figure 1-1
Sonoran Desert National Monument
Surface Administration



forest. The Monument contains three distinct mountain ranges: the Maricopa, Sand Tank, and Table Top Mountains, as well as the Booth and White Hills, all separated by wide valleys. The SDNM is also home to three congressionally designated wilderness areas: the North Maricopa Mountains Wilderness, the South Maricopa Mountains Wilderness, and the Table Top Wilderness, many significant archaeological and historic sites, and remnants of several important historic trails. The North Maricopa Mountains Wilderness has two hiking and equestrian trails, the 9-mile Margie's Cove Trail and the 6-mile Brittlebush Trail. The Table Top Wilderness also has two hiking and equestrian trails, the 7-mile Lava Flow Trail and the 4-mile Table Top Trail. A section of the Juan Bautista de Anza National Historic Trail crosses the SDNM. This congressionally designated trail parallels the Butterfield Overland Stage Route, the Mormon Battalion Trail, and the Gila Trail.

The rich diversity, density, and distribution of plants in the Sand Tank Mountains area of the SDNM is especially striking and can be attributed to the management regime in place since the area was withdrawn for military purposes in 1941.

Scientific analysis shows that the area received far more precipitation 20,000 years ago, and it slowly became more arid. Vegetation for the area changed from juniper-oak-pinion pine woodland to the vegetation found today in the Sonoran Desert, although a few plants from the more mesic period, including the Kofa Mountain barberry, Arizona rosewood, and junipers, remain on higher elevations and north-facing slopes.

The lower, flatter areas of the SDNM contain the creosote-bursage plant community. This plant community occurs over the open expanses between the mountain ranges and other plant communities. Rare patches of desert grassland occur in the Sand Tank Mountains area. The washes in the area support a much denser vegetation community than the surrounding desert, including mesquite, ironwood, palo verde/mixed cacti, desert honeysuckle, chuparosa, and desert willow, as well as a variety of herbaceous plants. This vegetation offers the dense cover bird species need for successful nesting, foraging, and escape, and birds heavily use this plant community during migration.

These diverse plant communities present in the SDNM support a wide variety of wildlife, including a robust population of desert bighorn sheep, especially in the Maricopa Mountains area, and other mammalian species, such as mule deer, javelina, mountain lion, gray fox, and bobcat. Bat species within the SDNM include the endangered lesser long-nosed bat, the California leaf-nosed bat, and the cave myotis. Over 200 species of birds are found in the SDNM. Numerous species of raptors and owls inhabit the SDNM, including the elf owl and the western screech owl. The Monument also supports a diverse array of reptiles and amphibians, including the Sonoran desert tortoise and the red-backed whiptail. The desert tortoise occupies approximately 25,000 acres of habitat in the Maricopa Mountains.

1.3.2 Decision Area

While the planning area encompasses approximately 496,400 acres spanning two counties and areas of private and state land, BLM management applies only to public lands, meaning those lands where the BLM has management responsibility for either the surface or the subsurface estate. Therefore, the decision area encompasses 486,400 surface acres of public lands and 461,000 acres of subsurface land.

1.4 Planning Process

Land use plans are "designed to guide and control future management actions and the development of subsequent, more detailed and limited scope plans for resources and uses" (43 CFR, Parts 1601.0-2). The BLM has determined that changes to the recreation program plan-level decisions in the 2012 SDNM RMP must be made through the RMPA/EIS process.

The BLM planning process for an EIS-level RMPA, as set forth in the federal regulations at 43 CFR, Part 1600 and the land use planning guidance found in the BLM Land Use Planning Handbook (H-1601-1), consists of the following steps for an EIS level RMPA, listed below in **Table 1-2**.

Table 1-2
RMPA Planning Process

Step/Task
1. Publish NOI, Initiate Scoping
2. Conduct Scoping
3. Formulate Alternatives
4. Analyze Effects of Alternatives/Identify the Preferred Alternative
5. Prepare a Draft RMPA/EIS
6. Provide a Public Comment Period
7. Prepare a Proposed RMPA/Final EIS
8. Provide a Protest Period and Resolve Protests
9. Conduct a Governor's Consistency Review Period
10. Prepare a Record of Decision/Approved RMPA
11. Implement, Monitor, and Evaluate Plan Decisions

1.4.1 Cooperating Agencies and Consulting Parties

40 CFR, Parts 1501.6 and 1508.5 implement the cooperating agency provisions of NEPA. At the beginning of the scoping process for this RMPA, the BLM invited state and local governments and agencies with lands adjacent to the planning area, as well as tribal governments of those American Indian tribes that claim cultural affiliation to the planning area, to become cooperating agencies in the planning process.

The following is a list of the cooperating agencies that signed Memoranda of Understanding under NEPA to participate as cooperating agencies in this planning process:

- Tonto National Forest
- Prescott National Forest
- Arizona Game and Fish Department
- Pinal County
- Ak-Chin Indian Community

1.4.2 Tribal Consultation

As part of the planning process, the BLM extended invitations to participate as cooperating agencies and initiated government-to-government consultation with the following Native American tribes:

- Ak-Chin Indian Community
- The Hopi Tribe
- Salt River Pima-Maricopa Indian Community
- Gila River Indian Community
- Tohono O'odham Nation

Within the planning process, the BLM recognizes that it carries the responsibility of complying with Section 106 of the National Historic Preservation Act. Therefore, the BLM, under Section 7 of the Arizona State Protocol Agreement, has invited the SHPO to participate in the development of this Resource Management Plan Amendment and EIS. The participation of the SHPO is critical for the agency to more fully "inform the analysis of cumulative effects," provide strong "historic preservation considerations," and as a way to "influence large-scale decisions."

1.5 Public Scoping

The formal public scoping process for the SDNM RMPA began with the publication of the NOI in the Federal Register on January 21, 2015 (81 *Federal Register* 3463); the BLM also posted the NOI on the project website (http://1.usa.gov/1ZPyFSA). It served to notify the public of the BLM's intent to develop an RMPA for the SDNM planning area and identified the preliminary issues to be considered in the RMPA process. The initial scoping period was 60 days for development of alternatives and preparation of the Draft EIS.

1.5.1 Results of Scoping

The BLM received 376 scoping comments. Of these, 325 were submitted electronically via email, and 10 were submitted electronically via the BLM's ePlanning system. In addition, 29 were submitted on BLM comment forms at the

public information meetings held in February 2016, 10 were mailed letters, and 2 were received via fax.

Some comments were received more than once. For example, a small number of comment letters were faxed and emailed or emailed and mailed. Where possible, duplications were paired up and counted as only one comment letter; however, only a few were duplications. Comment letters that were addendums to previous submissions or represented additional comments were counted as a second letter.

All scoping comments were read and reviewed. Of the 376 total comments received, 113 were coded as opinion only and did not contain a specific theme. The remaining 263 scoping comments were entered into a tracking spreadsheet and organized by category and subcategory.

1.5.2 Planning Issues

The following sections provide a summary of the scoping comments by category. Because of ecological or behavioral relations, some issues apply to more than a single category for sorting or analysis purposes. As a result, and for ease of reading, some resources have been grouped in order to simplify the format of the analysis.

Presidential Proclamation/Monument Objects

A number of comments centered on the importance of the Monument's presidential proclamation and the importance of protecting the Monument objects. Some commenters specifically indicated that allowing recreational target shooting on any areas of the SDNM goes against the reasons National Monuments are set aside for the public's enjoyment. A significant number of these commenters specifically mentioned damage and vandalism to the saguaro cactus forests. Commenters also mentioned that there are other adequate areas designated for recreational target shooting on BLM-administered lands around the perimeter and outside the Monument, while others recognized that if more federal lands for recreational target shooting are needed, they should be in areas with broad multiple use management policies and not in designated monuments.

Public Safety

Safety related to recreational target shooting in the SDNM was a main theme in the majority of comments, as well as the associated mitigation actions that could eliminate or significantly reduce unsafe situations. Comments on safety ranged anywhere from completely disallowing recreational target shooting to allowing it with appropriate safety measures. A great deal of concern was expressed by some members of the public about feeling unsafe in areas where recreational target shooting is allowed. A select few have personally experienced shooting in their direction by others engaging in the activity, and even others commented that allowing recreational target shooting essentially disallows other activities due to safety issues.

Some comments from recreational target shooting enthusiasts stated that although shooting sports are an important recreational pastime in Arizona, due to population increases and the number of suitable places for recreational target shooting being smaller, an increase in the number of recreationists, usage conflicts, and accidents are possible. Last, a significant number of commenters stated that they would like to see some recreational target shooting allowed but only in a very safe manner, far away from residences, highways, roads, parking lots, and where other recreationalists frequent. Safety measures that include berms and hills as safe backstops were also seen as necessary. A few other comments included thoughts that a permanent closure to recreational target shooting would simply shift recreational target shooting and its associated problems to new areas within or adjacent to the planning area, making it just as undesirable and/or unsafe.

Socioeconomic

The Monument designation and management can impact economic and social opportunities and/or circumstances for the local community through recreational opportunities and tourism. A number of commenters emphasized contributions to the local economy from target shooters who use local services such as hotels and restaurants, specifically hunters who utilize the area for practice prior to hunting and campers who incorporate recreational target shooting into their hiking and camping trips to the Monument. One commenter mentioned that sportsmen and -women use federal lands for recreational target shooting to practice and sight-in rifles, and by purchasing hunting tags, they contribute taxes to support the land and wildlife.

Other socioeconomic benefits were quality and ways of life for Arizona residents, family traditions that have always included shooting in their activities, and teaching children how to shoot responsibly in an outdoor environment at a relaxed pace rather than in a stressful and loud shooting range environment. A number of comments simply indicated that recreational target shooting has always been an enjoyable activity for them and that most responsible shooters clean the areas in which they shoot, resulting in less money needing to be spent on federal cleanup. Last, a few comments mentioned that by providing too many recreational target shooting opportunities on public lands, the private shooting range market will actually be suppressed.

Partnerships, Outreach, and Education

Many commenters expressed their ideas relating to enhancing current partnerships and forming new ones with outside agencies and groups to provide outreach and education to the public on gun safety and responsible recreational target shooting. They asked the BLM to consider on- and off-site outreach and education of target shooters and other users of the SDNM. A significant number of commenters asked the BLM to consider partnering with gun stores, gun show exhibitors, and the recreational target shooting community to help resolve user conflicts, decrease resource degradation, and provide accurate

education and information about areas that are available and restricted to recreational target shooting. Many are members of these groups themselves and have offered their assistance. Even others suggested regularly scheduled cleanup events they would help advertise. A number of commenters who belong to the recreational target shooting community recommended utilizing the assistance of these groups, perhaps creating Memorandums of Agreement and adding that because they are the ones using the lands for this purpose, they can make a direct impact.

Impacts on Natural Resources, Habitat, and Its Uses

Vegetation

Vegetative Monument objects in the SDNM include large saguaro cactus forest communities, unique woodland assemblages, palo verde/mixed cacti associations, dense stands of leguminous trees, rare acuña cactus, desert grasslands, and dense wash vegetation communities. It was recognized that this vegetation provides dense cover for bird species necessary for nesting, foraging, and escaping. Commenters expressed concern that not only can recreational target shooting vandalize the diverse vegetation of the SDNM, the effects can be long-term. The vegetation is considered a Monument object, and these impacts would negatively impact habitat.

Wildlife and Special Status Species

Prominent wildlife in the SDNM includes the gray fox, mountain lion, desert bighorn sheep, mule deer, javelina, and bobcat. Special status species include the lesser long-nosed bat. In addition, over 200 species of birds, including raptors and owls, have been observed in the SDNM, as well as a diverse array of reptiles. These are Priority Species in the Monument. There was significant concern among commenters as to how these species will be managed if recreational target shooting were allowed, and how fragmentation of wildlife habitat would be avoided with the presence of recreational target shooting. Would the BLM restrict activities in certain areas during certain times of year to avoid negative impacts on breeding or nesting birds or wintering populations of big game? Could specific areas be set aside so as to not negatively affect wildlife? Does wildlife need protection from recreational target shooting activities, and if so, how can this be done? Other concerns centered entirely on illegal dumps that could consume the area, resulting in impacts on the habitat and possible consumption of solid waste by wildlife mistaking it as food.

Impacts on Cultural Resources and Historic Properties

Regarding safe access to rock art sites by tribes wishing to visit for religious and/or cultural reasons and for protecting the auditory, visual, and physical integrity of these sites.

A few archaeological-related groups and individuals were very concerned that increased access for any purpose, particularly recreational target shooting

activities, would put fragile cultural and environmental resources at great risk. Their belief is that once access is granted for recreational target shooting, other activities such as illegal excavation of archaeological sites and the driving of vehicles in unauthorized areas will take place.

Concern among several commenters centered on both cultural and historical resources that can be seen as well as those that cannot or have not yet been discovered. Environmental resources are very delicate and could suffer gravely from increased traffic in this area.

In their comment letters, the American Rock Art Research Association asked if the priority is to provide a public-lands shooting range or to protect irreplaceable historic resources. They asked the BLM to consider other places for recreational target shooting rather than in and around the unique and impressive rock art of the Monument. This rock art, once damaged, can never be repaired. In addition, they commented that while other areas can be set aside for recreational target shooting, this rock art can only be studied and enjoyed in the place where it was made and protected by generations of Native Americans.

Some commenters expressed support for recreational target shooting in specific areas once an inventory was completed for any cultural resources. They understand the need to zone areas that do not contain these artifacts, while other groups are simply in favor of recreational target shooting anywhere on public lands.

Noise

Noise was a significant theme among many of the comments received. All of these understood that BLM monuments are presidential proclamations set aside for specific conservation efforts, over and above regular multiple use management principles on BLM-administered lands. As such, these comments were received from a number of groups and individuals who are deeply concerned about noise pollution and the negative impact it has on enjoying quiet recreational opportunities and the solitude expected in a National Conservation Lands area, but also the negative impacts noise can have on wildlife over time.

All comments received on the subject of noise determined it to be a negative issue. Overall, these commenters desire to recreate on designated wilderness areas while enjoying the solitude indicative of these areas. Some asked that, at the very least, wilderness areas of the Monument be spared any recreational target shooting. Others asked for full closure of the Monument to recreational target shooting, stating that there are other areas to target shoot on federal lands and that the BLM should designate areas outside of the Monument or in alternate areas to allow recreational target shooting activities. A few indicated that a balance could be found if the BLM set aside concentrated zones for recreational target shooting, allowing the remainder of the Monument to provide solitude for recreationists. Last, a few commented that in their own experience, noise from recreational target shooting greatly detracted from their

enjoyment of the land for a distance of approximately two miles from the shooting noise.

Hazardous Materials and Illegal Dumping

Recreational target shooting can result in an abundance of illegal dumps on public lands, and many are concerned that some of the illegal dumps could be hazardous to human health, wildlife, and the surrounding environment. Areas affected by illegal dumping become unattractive to visitors and may reduce the value of adjacent private property. In addition, many comments were directly related to the amount of household solid waste, used targets, and "trigger trash,"—or metals/bullet casings—resulting from recreational target shooting that can be found at recreational target shooting sites on public lands. Even those who are avid target shooters and have frequented the SDNM for this purpose admitted this is the one issue they wish could be resolved and that disappoints them. Many target shooters indicated in their comment letters that they bring their own bags and clean up not only their residual solid waste, but others' solid waste as well. How can the BLM prevent trigger trash and environmental degradation?

It is supposed by commenters that a great deal of the solid waste in the SDNM is attributed to illegal dumping and illegal trespassing by way of the border, and recreational target shooting enthusiasts feel negatively and have expressed their displeasure at being the prime targets of illegal dumping in the Monument.

Many comments on this also tie into the education/partnership issue in that they provided ideas as to how trigger trash and illegal dumping might be prevented and/or managed in the long term. They suggested cleanup days, monitoring, and additional enforcement, which ties into the enforcement issue, but also temporary closures as needed for mitigation purposes. Would a closure simply shift the trigger trash, illegal dumping, environmental risks, and lead contamination to new areas/locations? Commenters tended to disagree on how much trigger trash is considered hazardous waste, but they did suggest the BLM use its own data analysis to make these decisions.

Approximately 10 commenters specifically mentioned contamination from lead shot onto the landscape and in the habitat, possibly having negative cumulative effects on the wildlife that comes into contact with these areas. One commenter specifically mentioned cumulative costs that could result in environmental damage cleanup.

Enforcement, Application of Supplementary Rules, and Mitigation

Enforcement of current BLM supplementary rules and policy was a common theme for the majority of commenters with identified issues. The majority of the comments centered on the BLM enforcing rules on those users who litter and vandalize the SDNM rather than fully closing the Monument, which punishes everyone. Questions were asked about law enforcement practices that would be more effective and/or economical than closure, such as increased patrols.

While some believed that these supplementary rules can be enforced to some extent if recreational target shooting were concentrated to specific areas, most who commented on this issue agreed that it is impossible to successfully monitor and enforce rules in the entire area—or even the majority—if the Monument were completely available to recreational target shooting. Some comments were submitted by the public who agreed that the only way to enforce would be to either keep the entire Monument available with no management actions, or restrict it altogether.

There was concern that the BLM cannot address and fully monitor violations. Some commented that the BLM should add penalties in the form of fines to target shooters who leave solid waste and others who illegally dump on public lands, as well as those who engage in recreational target shooting in restricted areas. Others had ideas about a possible permit system to use zoned areas that may prove effective. Some added that perhaps implementing a fee for permits or for access could be used toward necessary and periodic cleanup of these areas. Some users admitted that they witness a great deal of solid waste in areas in which recreational target shooting is taking place, they have seen vandalism of some cultural resources in the form of rock art, and they clearly understand the limitations that are being considered due to the fact that enforcement is almost impossible.

Commenters who belong to recreational target shooting and sportsmen's and -women's clubs indicated that these groups would be willing to assist the BLM with enforcement of areas available to recreational target shooting. They indicated that since they understand recreational target shooting rules and are on the ground anyway, they could offer assistance. Some also added that without the support of outside groups, there is no way that recreational target shooting in the Monument would be successful without damage to Monument objects. Others expressed a commitment to partnering with the BLM and other recreational target shooting groups to assist with the management of recreational target shooting areas and recommended that a partnership plan be developed.

Scientific Data and Analysis

About 12 commenters mentioned the BLM's data and analysis related to recreational target shooting areas. Out of these, most recommended that the BLM use the data and science that they gathered during the formation of the original RMP. They recommended that if the BLM were to follow that and make the decision using those results, that would be sufficient. A few believed the analysis was sound and thorough and interpreted it to read that recreational target shooting should be allowed in accordance with it, while other groups interpreted it to illustrate that recreational target shooting would not be feasible in the Monument. Some commenters emphasized the necessity of a complete survey of rock art within the planning area, conducted by professional

archaeologists, if the decision is made to allow recreational target shooting in the Monument.

Zoned Areas and Limitations of Accessibility/Alternate Areas

The majority of the comments received discussed zoned areas to some extent. Many are in favor of setting aside specific areas for recreational target shooting, understanding the BLM's multiple use and sustained yield mandate as well as the conservation decisions they must manage.

Some were in favor of very concentrated, easily accessible areas that could be used and enforced, and that were safe with natural backstops. Others were in favor of zoning a much larger area (or a number of areas) in the Monument. Most of the comments understood and recommended that the BLM find, at the very least, a few safe areas for recreational target shooting that could create a balance of resources usable for all. A number of these comments came from individuals but also from some wildlife groups and support partners, such as the Public Lands Foundation.

A significant number of commenters asked the BLM to designate alternate areas outside of the Monument for recreational target shooting. Pinal County wrote in as well, notifying the BLM that it is planning a recreational park outside of, but in close proximity to, the Monument. It asked the BLM to partner with the state in an agreement to create a recreational target shooting park.

Other commenters were unhappy that an increasing amount of public lands are being restricted to recreational target shooting due to designation of specific lands and the encroachment of the urban interface. These commenters have a desire for places to target shoot; many indicated they did not care where they could practice this activity as long as they were out on the lands, while others did not understand why the Monument would be zoned off or closed entirely. This theme was one of the most popular, whether it was for zoning or against it altogether.

Cumulative Impacts

Comments about cumulative impacts centered on the idea that closures to recreational target shooting concentrate the activity. One perspective was that concentration of the activity allows for easier enforcement and mitigation in the form of cleanup, because allowed areas are so small. The other perspective was that because the activity is concentrated and it receives denser usage, cumulative effects are more significant, and cleanup and mitigation measures would be needed more often than the BLM could enforce, handle, or fund.

Almost all of the comments received on this issue that expressed concern for any natural and cultural resource also mentioned cumulative impacts on these resources. Specifically mentioned was the concern that negative impacts of recreational target shooting, over time, prove especially detrimental to Monument objects, such as specific vegetation (e.g., saguaro cactus forests), as

well as cultural resources (e.g., rock art), because damage to these resources is irreversible.

1.5.3 Issues Addressed Through Policy, Regulation, or Administrative Actions

Policy or administrative actions do not require a planning decision to implement. They include those actions that are implemented by the BLM as a Standard Operating Procedure (SOP), because they are required by law or because they are the established BLM policy.

The following issues can be addressed by administrative actions:

- Complying with existing laws and policies (FLPMA, NEPA, Endangered Species Act, American Antiquities Act, Clean Air Act, National Historic Preservation Act, etc.)
- Conducting education, enforcement/prosecution, and volunteer coordination
- Managing petroglyphs (historic properties), including up-to-date inventories, and nondisclosure of spatial data
- Administering existing leases, permits, other authorized uses and valid existing rights
- Standard law enforcement operating procedures, which will be followed as described in the Phoenix District Office Law Enforcement Plan (BLM 2016)
- Citations that will be issued for illegal activities in accordance with all provisions provided for in 43 CFR, Subpart 8365.1-1(b) for dumping and littering; 43 CFR, Subparts 8365.1-5(a)(1) for vandalism and damage to resources; and 43 CFR, Subparts 8365.1-4(a)(2) for creating a hazard or nuisance. Recreational target shooting on BLM-administered land is an allowed activity (except where restricted), and it must be conducted in a safe manner.
- Conducting monitoring and assessment processes, including rangeland health, watershed, soils, vegetation, wildlife, and air quality
- Applying mitigation measures for site-specific projects
- Conducting emergency stabilization and rehabilitation planning and implementation

1.5.4 Issues Beyond the Scope of the RMPA/EIS

Consistent with the purpose of this action, issues addressed in this RMPA/EIS are those that deal specifically with the effects of recreational target shooting on Monument objects and other resources and uses in the Monument. Issues beyond the scope of the RMPA/EIS include all items not related to decisions that would occur as a result of this planning process. They include decisions that

are not under the jurisdiction of the SDNM or are beyond the capability of the SDNM to resolve as part of this recreational target shooting RMPA/EIS.

Certain types of comments do not warrant analysis in the EIS, because they do not provide information that is helpful or relevant to make a reasoned choice among alternatives. Comments that are not helpful or relevant include personal opinion with no supporting reason(s), discussion of other projects or project areas unrelated to recreational target shooting (beyond the scope of the RMPA/EIS), statements of disagreement with BLM or proclamation policies, and/or simple statements of agreement or opposition to the project.

Other program-specific issues were identified during the public scoping process beyond the scope of this RMPA/EIS. Issues identified in this category are as follows:

1. **Federal Jurisdiction and Second Amendment Rights**

   Comments regarding target shooters' rights and if a recreational target shooting closure or restriction constitutes an infringement on second amendment rights.

   BLM Response: Public lands are available to recreational target shooting, except in areas that are restricted for public safety or in areas restricted under planning decisions. A discussion about the second amendment is outside the scope of this RMPA.

2. **Impacts on Monument Objects by Items Other than Target Shooting**

   Comments claiming that other recreational and non-recreational activities other than recreational target shooting negatively affect Monument objects and areas within the Monument and that more attention should be paid to those sources.

   BLM Response: In general, locations where recreational target shooting takes place have large quantities of solid waste, much of which has been shot up. Whether this solid waste was already in these areas, brought in by nontarget shooters, or brought in by target shooters and then used as a target is outside the scope of this document. This RMPA/EIS focuses on the positive and negative impacts and public safety issues created by recreational target shooting within the area. Recreation and other uses and resources that occur in the Monument were analyzed in the existing SDNM RMP. For this RMPA, to the extent that the impacts of non-recreational activities are relevant for the cumulative effect analysis, these activities are addressed in Chapter 5.

3. Overarching (Multiple Use and Sustained Yield Mandate/Public Lands Access)

Comments that claim all land users have a right to access all public lands in accordance with FLMPA and BLM's multiple use policy, and, in addition, the freedom to perform any activity with no restrictions.

BLM Response: While all BLM-administered lands are to be managed under BLM's multiple use and sustained yield mandate, designated lands that are part of the National Conservation Lands are managed with a dominant conservation mission. Established in 2000 through a Secretarial Order signed by the Secretary of the Interior, the mission of the National Conservation Lands was to create a special system of BLM-administered lands managed to protect the values for which they were designated, including, where appropriate, prohibiting uses that are found to be inconsistent with those values. In 2009, through the Omnibus Public Land Management Act, Congress permanently established the National Conservation Lands "to conserve, protect, and restore nationally significant landscapes" (Secretarial Order 3308, November 15, 2010). Presidential Proclamation 7397, which was signed on January 17, 2001, identifies the values for the SDNM (see introduction).

Valid and Existing Management to be Carried Forward

Management goals and objectives (desired future conditions), allowable uses, and management actions approved by the 2012 RMP not directly related to recreational target shooting management in the SDNM will be unchanged. The SDNM will continue to be managed under the unchanged provisions of the 2012 RMP.

1.6 Planning Criteria

1.6.1 Legislative Constraints

Planning criteria guide development of the RMPA/EIS by defining the decision space. 43 CFR, Subparts 1610.4-2(b) states that the "Planning criteria will generally be based upon applicable law, Director and State Director guidance, the results of public participation, and coordination with any cooperating agencies and other Federal agencies, State and local governments, and federally recognized Indian tribes." Planning criteria represent the overarching factors used to resolve issues and to develop alternatives. The planning criteria considered in the development of this document are as follows:

- The RMPA/EIS addresses BLM-administered lands only
- The RMPA/EIS makes land use planning decisions specific to potential closure or restrictions of recreational target shooting to

determine the desired future condition and uses of these BLM-administered lands

- The RMPA/EIS utilizes a collaborative and multi-jurisdictional approach to determine the desired future condition of public lands
- The RMPA/EIS complies with NEPA, FLPMA, and other applicable laws, executive orders, regulations, and policy
- The RMPA/EIS recognizes valid existing rights
- The RMPA/EIS does not change existing planning decisions that are still valid

This planning effort is not intended to be a full RMP revision; rather, it is to make plan-level decisions for recreational target shooting consistent with the court's order. Due to the limited focus of this planning effort, decisions that would normally be considered in a full RMP revision will not be addressed.

Valid existing rights will not be affected by any alternatives analyzed in this EIS. The BLM has no authority over private, county, state, or other federal lands. No decisions shall be made by the BLM regarding use of firearms on private, county, state, or other federal lands.

1.6.2 Relationship to Other State and Local Plans

State of Arizona, County, and City Plans and Rules

The BLM will consider plans of other state, local, and federal agencies that are relevant in the development of this RMPA/EIS and will seek to be consistent with or complementary to these plans, as required by the consistency provisions of FLPMA (43 USC, Section 1712[c][9]) and BLM's planning regulations at 43 CFR, Subparts 1610.3-2. The plans the BLM will consider during this planning effort include:

- Maricopa Association of Governments. 2000. Desert Spaces Plan.
- Maricopa Association of Governments. 2004. San Tan Mountains Regional Park Master Plan Environmental Assessment. Maricopa County. 1991. Maricopa County LUP Mobile Planning Area. https://maricopa.gov/Planning/Resources/Plans/docs/pdf/mobileplan.pdf.
- Maricopa Association of Governments. 2008. Maricopa County 2020, Eye to the Future Comprehensive Plan. http://www.maricopa.gov/planning/Resources/Plans/docs/pdf/Carefree%20Highway%20Scenic%20Corridor.pdf.
- Pinal County. 2007. Open Space and Trails Master Plan. http://pinalcountyaz.gov/OpenSpaceTrails/Documents/FINAL%20Open%20Space%20and%20Trails%20Master%20Plan.pdf

- Pinal County. 2009. Pinal County Comprehensive Plan. http://pinalcountyaz.gov/CommunityDevelopment/Planning/Documents/CompPlan/00%20Comprehensive%20Plan%202013.pdf.
- National Park Service. 1996. Juan Bautista de Anza National Historic Trail Comprehensive Management and Use Plan Final EIS. http://www.nps.gov/juba/parkmgmt/juba-cmp.htm.
- Arizona Game and Fish Department. 2012. Arizona's State Wildlife Action Plan: 2012-2022. Arizona Game and Fish Department, Phoenix, Arizona.

Other documents that influence the scope of this planning effort include:

- Sonoran Desert National Monument RMP and ROD (BLM 2012)
- Presidential Proclamation 7397

1.6.3 Relationship to Other Federal Laws, Regulations, Policies, and Programs

Development of the recreational target shooting RMPA/EIS alternatives are consistent with the applicable federal and state laws, regulations, policies, county ordinances, and other plans to the maximum extent possible. Federal policies include Executive Orders (EO) and Department of Interior (DOI) and BLM Manuals, Handbooks, Instruction Memorandum (IM), and Information Bulletins (IB). Compliance includes the completion of procedural requirements—including consultation, coordination, and cooperation with stakeholders, interested publics, and Indian tribes—and completion of the applicable level of NEPA review.

These documents and their supporting information and analysis are hereby incorporated by reference as applicable to the management of recreational target shooting in the SDNM based on their use and consideration by various preparers of this RMPA/EIS.

Authorities (As Amended)

- American Indian Religious Freedom Restoration Act of 1978 (PL 95-431; 92 Stat. 469; 42 USC 1996)
- Antiquities Act of 1906 (54 USC, Sections 320301-320303)
- Archaeological Resource Protection Act of 1979 (PL 96-95; 93 Stat. 721; 16 U.S.C. 470aa et seq.
- Clean Air Act of 1977 (33 USC, Sections 1251 et seq.)
- Clean Water Act of 1977 (33 USC, Sections 1251 et seq.)
- Committee Report accompanying the Department of the Interior, Environment and Related Agencies, HR 83, December 16, 2014
- Endangered Species Act of 1973 (16 USC, Sections 1531-1544)

- Federal Land Policy and Management Act of 1976 (FLPMA; 43 USC, Sections 1701 et seq.)
- Federal Noxious Weed Act of 1974 (PL 93-629)
- Fish and Wildlife Act of 1956 (16 USC, Sections 742a et seq.)
- Fish and Wildlife Conservation Act of 1980 (16 USC, Sections 2901-2911)
- Hazardous Materials Transportation Act of 1975 (49 USC, Section 5101)
- Migratory Bird Treaty Act of 1918 (16 USC, Section 703)
- Migratory Bird Conservation Act of 1934 (16 USC, Section 715)
- National Historic Preservation Act of 1966 (54 USC, Sections 300101 et seq.)
- National Environmental Policy Act of 1969 (42 USC, Sections 4321 et seq.)
- National Trails Systems Act of 1968 (16 USC, Sections 1241 et seq.)
- Native American Graves Protection and Repatriation Act of 1990 (25 USC, Sections 3001 et seq.)
- Public Rangelands Improvement Act of 1978 (PL 95-514)
- Sonoran Desert National Monument Proclamation of 2001
- Taylor Grazing Act of 1934 (43 USC, Section 315)
- Wilderness Act of 1964

Regulations

- 36 CFR, Part 800 Protection of Historic Properties
- 36 CFR, Part 60 National Register of Historic Places Federal Program Regulations
- 36 CFR, Part 68 Secretary of the Interior's Standards for the Treatment of Historic Properties

Executive Orders

- Consultation and Coordination with Indian Tribal Governments, EO 13175
- Environmental Justice, EO 12898
- Indian Sacred Sites, EO 13007
- Responsibility of Federal Agencies to Protect Migratory Birds, EO 13186

Manuals and Handbooks

- BLM NEPA Handbook, H-1790-1
- BLM Land Use Planning Handbook, H-1601-1
- BLM CERCLA Response Handbook, H-1703-1
- BLM Land Health Standards, BLM Manual Section (MS) 4180
- BLM Rangeland Health Standards, H-4180-1
- Special Status Species Management, MS 6840
- Conducting Wilderness Characteristics Inventory on BLM Lands, MS 6310
- Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process, MS 6320
- Management of Designated Wilderness Areas, MS 6340
- National Scenic and Historic Trail Administration, MS 6250
- Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation, MS 6280
- Trail Management Areas – Secretarially Designated National Recreation, Water, and Connecting and Side Trails, MS 8353
- Travel and Transportation Manual, MS 1626
- Travel and Transportation, H-8342-1
- National Monuments, National Conservation Areas, and Similar Designations, MS 6220
- The Foundations for Managing Cultural Resources, MS 8100
- Identifying and Evaluating Cultural Resources, MS 8110
- Tribal Consultation Under Cultural Resource Authorities, MS 8120
- Protecting Cultural Resources, MS 8140
- Native American Consultation, MS 8160
- AZ H-8110 – Guidelines for Identifying Cultural Resources
- AZ H-8120 – Guidelines for Protecting Cultural Resources

Instruction Memorandum or Bulletins

- Assessing Tribal and Cultural Considerations, WO IM 2004-052

Memorandum of Understanding

- Memorandum of Understanding between the US Department of the Interior, Bureau of Land Management and the Fish and Wildlife

Service to Promote the Conservation of Migratory Birds, BLM MOU WO-230-2010-04

- Federal Lands Hunting, Fishing and Shooting Sports Roundtable Memorandum of Understanding, WO IM 2014-131

1.6.4 Recreation Management Specific Laws, Regulations, and Policies

Management of recreation on public lands is provided for under FLPMA and in the following regulations (including but not limited to):

- 43 CFR, Part 7.4 Prohibited Acts and Criminal Penalties
- 43 CFR, Part 2930 Permits for Recreation on Public Land
- 43 CFR, Part 8350 Management Areas
- 43 CFR, Part 8360 Visitor Services with Subpart 8364 Closures and Restrictions and Subpart 8365 Rules of Conduct

Laws, regulations, and policies specific to recreational target shooting include the following:

- EO 13443 "Facilitation of Hunting Heritage and Wildlife Conservation," August 16, 2007
- WO Memorandum "Protecting Recreational Shooting Opportunities on Public Lands," November 23, 2011
- WO IM 2008-074 Change 1 Methods for Authorizing Shooting Range Areas on Public Lands
- WO IM 2015-157 Advanced Congressional Notification for Proposed Closures Related to Recreational Shooting, Hunting, or Fishing, September 29, 2015
- WO IM 2014-131 Implementation of the Federal Lands Hunting, Fishing and Shooting Sports Roundtable Memorandum of Understanding, August 26, 2014

There are no BLM regulations (43 CFR) specific to recreational target shooting. However, there are several relevant regulations under which violations are cited. These include, but are not limited to, the following:

- 43 CFR, Subpart 4140.1 (b)(6) Acts prohibited on public lands. Littering.
- 43 CFR, Subpart 8365.1 Rules of Conduct for Public Land Users
- 43 CFR, Subparts 8365.1-4(a)(2) Public health, safety, and comfort. Creating a hazard or nuisance.

- 43 CFR, Subparts 8365.1-5(a)(2) Property and resources. Willfully deface, remove, or destroy plants or their parts, soil, rocks or minerals, or cave resources.
- 43 CFR, Subpart 8364.1(d) Closure and restriction orders. Violation of a closure or restriction order.

Laws, regulations, and policy specific to dumping on BLM-administered lands include the following. This includes trigger trash (e.g., spent bullet casings) and illegal dumping.

- 8364.1(d) Violation of closure or restriction orders
- 8365.1-1(b)(1) Disposal of nonflammable household waste except in place provided
- 8365.1-1(b)(2) Disposal of flammable household waste except in authorized fire or place provided
- 8365.1-1(b)(3) Drain or dump refuse or waste from trailer or other vehicle:
  - Sewage
  - Petroleum products
- 8365.1-1(b)(4) Dispose of any household, commercial, or industrial waste or refuse:
  - Household
  - Commercial
  - Industrial

This page intentionally left blank.

Chapter 2

TABLE OF CONTENTS

Chapter Page

2. ALTERNATIVES 2-1

2.1 Introduction 2-1
2.2 Alternatives Development 2-1
2.2.1 Brief Description of Alternatives 2-2
2.2.2 Common to All Alternatives 2-2
2.2.3 Alternative A: No Action Alternative - All Areas Available to Target Shooting 2-7
2.2.4 Alternative B: Temporary Restriction on Target Shooting Becomes Permanent 2-9
2.2.5 Alternative C (Agency Preferred): Target Shooting Available in the Desert Back Country Recreation Management Zone 2-11
2.2.6 Alternative D: Target Shooting Available Outside Designated Wilderness, Lands Managed to Protect Wilderness Characteristics, and the Juan Bautista de Anza NHT RMZ 2-14
2.2.7 Alternative E: Target Shooting Restricted in All Areas 2-17
2.2.8 Comparison of Available vs. Restricted Areas within the Decision Area 2-19
2.2.9 Alternatives Considered but Eliminated from Further Study 2-19
2.3 Summary Comparison of Environmental Consequences 2-19

TABLES

Page

2-1 Alternatives Allocation Summary 2-19
2-2 Summary of Environmental Consequences of Alternatives A, B, C, D, and E 2-20

FIGURES

Page

2-1 Alternative A 2-8
2-2 Alternative B 2-10
2-3 Alternative C 2-13
2-4 Alternative D 2-16
2-5 Alternative E 2-18

This page intentionally left blank.

CHAPTER 2
ALTERNATIVES

2.1 INTRODUCTION

The RMPA/EIS alternatives focus solely on where recreational target shooting activities would be allowed and considers the use of monitoring and mitigation to reduce possible impacts on resources from that activity and other uses in the Monument in response to court order No. CV-13-01973-PHX-DGC. The range of alternatives meets the purpose and need for the RMPA/EIS and responds to issues raised during scoping, including protection of public safety and Monument objects. These alternatives also support the goals and objectives for the Extensive Recreation Management Area included in the SDNM RMP and ROD. The alternatives are described in detail in **Sections 2.2.1** to **2.2.5**.

Five preliminary alternatives were shared with the public at an open house on October 4, 2016 (see **Section 6.2.2** for more information).

2.2 ALTERNATIVES DEVELOPMENT

The BLM used several sources of input to formulate alternatives. The BLM published an NOI in the *Federal Register* announcing the EIS and initiating scoping. Public scoping occurred from January 21, 2016, to March 21, 2016, which provided an opportunity for interested members of the public and local governments, as well as other resource and land management agencies, to comment on the planning process and/or management concerns. Comments received were analyzed in a series of work sessions with the ID Team, where preliminary alternatives were developed. Planning challenges identified through the BLM's preplanning and public scoping efforts helped the ID Team identify key planning issues to be addressed in the Draft RMPA/EIS. Based on internal and external scoping, the BLM identified and developed five preliminary alternatives.

2.2.1 Brief Description of Alternatives

Alternative A

Current management, per the Lower Gila South RMP (BLM 1988) would continue. This RMP did not set management guidance for recreational target shooting and did not set any restrictions regarding areas for recreational target shooting. Thus, the existing management guidance for recreational target shooting within the Monument is for no restrictions.

Alternative B

Under Alternative B, the area that is temporarily restricted under the 2015 court order (approximately 10,100 acres in the decision area) would become permanently restricted for recreational target shooting. The court's order and injunction found this temporary closure to be an appropriate measure "that will limit the damage that recreational shooting is inflicting on Monument objects, including but not limited to damage to animals and their habitats, protected plants and vegetation, sites of historic or archeological significance, and areas used by the public."

Alternative C (Agency Preferred Alternative)

Alternative C, the agency preferred alternative, protects Monument objects and public safety by restricting recreational target shooting in the Juan Bautista de Anza NHT RMZ while making recreational target shooting available in the Desert Back Country RMZ. Together, these two RMZs, which were established in the 2012 RMP, comprise the entire SDNM.

Alternative D

Under Alternative D, the Juan Bautista de Anza NHT RMZ, three designated wilderness units, and lands managed to protect wilderness characteristics would not be available to recreational target shooting. This alternative focuses on protection of wilderness characteristics, public safety, and Monument objects found in these areas.

Alternative E

Under Alternative E, recreational target shooting would be restricted in the decision area. This alternative would ensure the greatest protection of the Monument and public safety.

2.2.2 Common to All Alternatives

Under all alternatives, anyone engaging in recreational target shooting activities within the SDNM must comply with all standard operating procedures and administrative actions described in the Recreational Target Shooting section and Appendix D of the 2012 SDNM RMP (BLM 2012), as adopted in the ROD, applicable laws, regulations, and policies:

> Public lands administered by the BLM are generally available for recreational target shooting unless otherwise specifically closed to that

use. BLM will work with the public, organizations, and law enforcement to promote safe shooting practices that limit user conflicts and damage to natural and cultural resources. The following discussion describes criteria for the selection of safe and considerate shooting sites.

It is the ultimate responsibility of the recreational target shooter to ensure the projectiles they fire are contained within the shooting site they select. While shooting is allowed in most public land areas, the shooter should make no concession concerning safety. Consideration of other people using public lands is not only considerate, Arizona Revised Statutes Title 13-1201 says:

A. A person commits endangerment by recklessly endangering another person with a substantial risk of imminent death or physical injury

B. Endangerment involving a substantial risk of imminent death is a class six felony. In all other cases, it is a class one misdemeanor.

General considerations for selecting a suitable shooting site include the following:

Select a site with a safe backstop. That means that it is visibly apparent where the bullets are hitting behind the target. A hill or pushed-up berm of dirt is perfect. Remember that bullets can ricochet off flat surfaces—that includes rocks, dirt and water. Place targets right in front of the backstop to ensure that bullets stop in the dirt.

Select a site that doesn't put others at risk. Do not shoot towards or across areas where other people congregate such as hiking trails, vehicle parking and staging areas, and trail heads. It is a violation of Arizona State law (A.R.S. 17-301B) to shoot across a maintained road. Though this law only pertains to maintained roads, there are many routes in the desert that are used by motorcycles, quads, and four-wheel drive vehicles that are not as apparent as a maintained road. Shooting in the direction, or across them, though not a violation of the referenced law, could be just as dangerous to people using them. Choose a site that avoids shooting across or towards motorcycle, quad, or four-wheel-drive routes as well.

In addition to motorized routes, there are many popular hiking, bicycling, and equestrian trails. Select a site that doesn't cross or shoot in the direction of a trail that could put people at risk.

Selection of a safe shooting site would include staying more than ¼ mile from any residence or occupied structure. When selecting a site, assume any structure is occupied. It is a violation of Arizona State Law

to knowingly discharge a firearm at a structure. The statue (A.R.S 13-1211A and B) says:

A. A person who knowingly discharges a firearm at a residential structure is guilty of a class two felony

B. A person who knowingly discharges a firearm at a nonresidential structure is guilty of a class three felony

Selection of a site should include avoiding such improvements as wildlife or livestock water facilities, livestock control facilities such as corrals and fences, signs or kiosks installed to provide information, barns or other rural developments, or any other improvement that was not specifically designed to be shot at.

It is a violation of Arizona State law (A.R.S. 13-1603A 1) if a person "Throws, places, drops or permits to be dropped on public property or property of another which is not a lawful dump any litter, destructive or injurious material which he does not immediately remove." This includes not only household waste, but also brass or shells (including shotgun shells) from spent ammunition, and items used as targets. Shooters are required to remove any targets, items on which targets are mounted, and brass from spent ammunition. BLM Phoenix District policy is to only use targets that do not produce litter and to remove them when shooting is finished.

Under the Code of Federal Regulations (43 CFR 8365.2-5(a)) no person shall "Discharge or use firearms..." on a developed recreation site. (43 CFR 8360.0-5(c) defines "Developed Recreation Sites and Areas" as "...sites and areas that contain structures or capital improvements primarily used by the public for recreation purposes. Such sites or areas may include such features as: delineated spaces for parking, camping or boat launching; sanitary facilities; potable water; grills or fire rings; or controlled access."

Selecting sites with side berms and backstops is optional where the shooter can be assured of safe shooting 1.5 miles downrange for pistol or 3.5 miles downrange for high powered rifles, with appropriate left and right ricochet safety zones. With the popularity of public lands for recreation and other uses, this scenario is the exception rather than the rule. Therefore, the primary purpose for selection of backstops and side berms is to protect against the injury of people, the damage of property or both.

The type of firearms being fired and the shooting activity being conducted will dictate the extent of the backstops, side berms and safety fans required to achieve that goal.

A downrange safety fan is an area beyond the backstop and side berms that is free of people or property that can be injured or damaged by errant bullets. It is important to remember that, depending on the suitability of the backstop and side berms, a safety fan downrange will be required to assure a safe shooting area. Below are ideal specifications for both backstops and side berms. Sites with less than ideal backstops and side berms must have increasingly longer downrange safety fans, approaching the distances described above of 1.5 miles for pistols and 3.5 miles for high power rifles. Even with an ideal backstop and side berms, site selection should still consider downrange safety and a downrange safety fan.

The characteristics of safe backstops and berms recognized as needed for safe shooting practices are as follows:

- Height. Preferred backstops include naturally occurring hills or mountainsides, or steep-sided wash banks. Backstops of soft dirt are preferred over hard surfaces, and rocky slopes should be avoided as they create a high ricochet hazard. A minimum height of 15 feet is acceptable but 20 to 25 feet is recommended. Remember that bullet ricochet can happen even on the best backstop. Site selection should consider ricochet possibilities and backstops that exceed 20 to 25 feet should be chosen where possible to reduce ricochet away from the shooting area.

- Width/Length. The width of the backstop should be at least as wide as it is high. Targets should be placed directly in front of or on the backstop with sufficient backstop on either side to catch bullets. Ideally, side berms should be the same height and the full length of the shooting area from the backstop to even with the firing line.

- Slope. The range side slope (side facing the shooter) must be as steep as possible, but not less than a 45-degree slope (a ratio of one-to-one). Side berm slopes should have the same dimensions.

The bottom line is to select a shooting site in harmony with adjacent properties and other public land users. The site should prevent adjacent properties and other public land users from experiencing any risk from the shooting activities. The overall responsibility of the shooter is to stop fired bullets before they exit the selected shooting area. It is the intention of the BLM to provide a safe and pleasant experience for any public land user. If shooting areas emerge that are contrary to the above criteria they will be clearly construed as putting other public land users

at risk and they may be closed to shooting by the BLM Authorized Officer, either temporarily or permanently (BLM 2012).

Monitoring and Mitigation Hierarchy

As directed by FLPMA and the Monument Proclamation, the BLM is charged with protection of resources and Monument objects. Accordingly, agency staff regularly patrol the Monument to observe resource conditions and promote public safety. Additionally, the agency utilizes "Friends" groups and other trained citizens to assess resource conditions and notify the agency of damages to cultural sites.

Management actions and monitoring programs are designed to generate reliable feedback and clarify the reasons for results. By providing for a range of management options/responses that could be implemented in response to resource concerns, land managers can move more quickly to implement additional resource protection measures if impacts warrant/require additional protection. In turn, if impacts are less than anticipated or can be quickly mitigated, management actions can allow more resource use to better accommodate public requests.

By stating up front in this document what actions might be taken in response to specific conditions, the agency can take these actions, because they are consistent with the plan decisions. Additional NEPA analysis may not be necessary, because these actions were analyzed in the NEPA analysis for this plan amendment. Actions and objectives can then be adjusted based on this feedback and improved understanding so that attempts to achieve the desired future conditions can be continued. Decisions, actions, and results are carefully documented and communicated to others so that knowledge based on experience is passed on, rather than lost, when individuals move or leave the organization.

A scaled implementation of mitigation (a mitigation hierarchy) acknowledges that incomplete data exists when dealing with natural resources and that through continued research and monitoring of management practices, new information would be collected. This new information is evaluated. Then a new determination is made whether to adjust the strategy accordingly to improve successes in meeting the plan's objectives.

In addition to current outreach and education efforts designed to avoid impacts, monitoring would be done in the SDNM to assess impacts from recreational target shooting on Monument objects and the desired future condition for recreation resources. Mitigation measures would be applied to address impacts found. The level of the mitigation measures applied would be appropriate for the level of impact noted. Additional monitoring would be completed to gauge the effectiveness of the mitigation. If the follow-up monitoring finds the mitigation measures don't reduce the impacts or aren't achieving the desired future conditions, additional, more intensive mitigation would be applied.

Impacts from all activities, including those from recreational target shooting, would be periodically monitored and assessed with respect to thresholds of impact in **Appendix B**. Management responses would correspond to the observed levels of impact. Remediable and non-remediable impacts would be assessed for physical impacts on resources, visitor perceptions of experienced opportunities, and administrative considerations through measurement of key variables.

Examples of measurements include the number of impact sites, density of impact sites, classification of impact sites, and ability and cost of remediating impact sites. Should impacts exceed established thresholds, the BLM would provide a scaled response proportionate with the level of impact(s) detected. The BLM Authorized Officer may choose from a variety of different mitigation measures that would include, but not be limited to the following:

- Initiating site-specific educational efforts
- Increasing regulatory signage
- Increasing law enforcement presence
- Undergoing the physical remediation of impacts
- Delineating temporary site restrictions
- Establishing permanent site restrictions

More examples of the possible monitoring and mitigation framework are provided in **Appendix B**.

2.2.3 Alternative A: No Action Alternative - All Areas Available to Target Shooting

The recreational target shooting decisions in the 2012 ROD were vacated by the United States District Court of Arizona in March 2015. Because the Court Order vacated the planning decisions relating to recreational target shooting in the SDNM RMP (BLM 2012), the guidance for recreational target shooting of the last valid management plan for the area remains in effect. The Lower Gila South RMP (BLM 1988) did not set management guidance for recreational target shooting and did not set any restrictions regarding areas for recreational target shooting. Thus, the existing management direction for recreational target shooting within the Monument is for no restrictions. Under the No Action Alternative, no change to current management guidance would occur, meaning no restrictions to recreational target shooting would occur (recreational target shooting would be available on 486,400 acres; see **Figure 2-1**, Alternative A). The BLM would monitor the SDNM for impacts related to the recreational target shooting allowed under this alternative and apply mitigation measures as identified in the monitoring and mitigation framework plan to protect Monument objects and meet the goals and objectives in the existing SDNM ROD (see **Appendix B**).

Figure 2-1
Alternative A: No Action Alternative - All Areas Available to Target Shooting

Available for Recreational Target Shooting
Designated Wilderness Area
Sonoran Desert National Monument Boundary
Roads, Primitive Roads, and Trails

Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
North Maricopa Mountains Wilderness
Juan Bautista de Anza NHT
Mobile
Maricopa
238
BLM Road 8004
Bosque
South Maricopa Mountains Wilderness
Maricopa County
Pinal County
347
Stanfield
84
Big Horn
8
Freeman
Table Top Wilderness
Jekol Valley Road

ARIZONA
Phoenix
Tucson
Map Location

Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_Alts_A_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 5 10
Miles

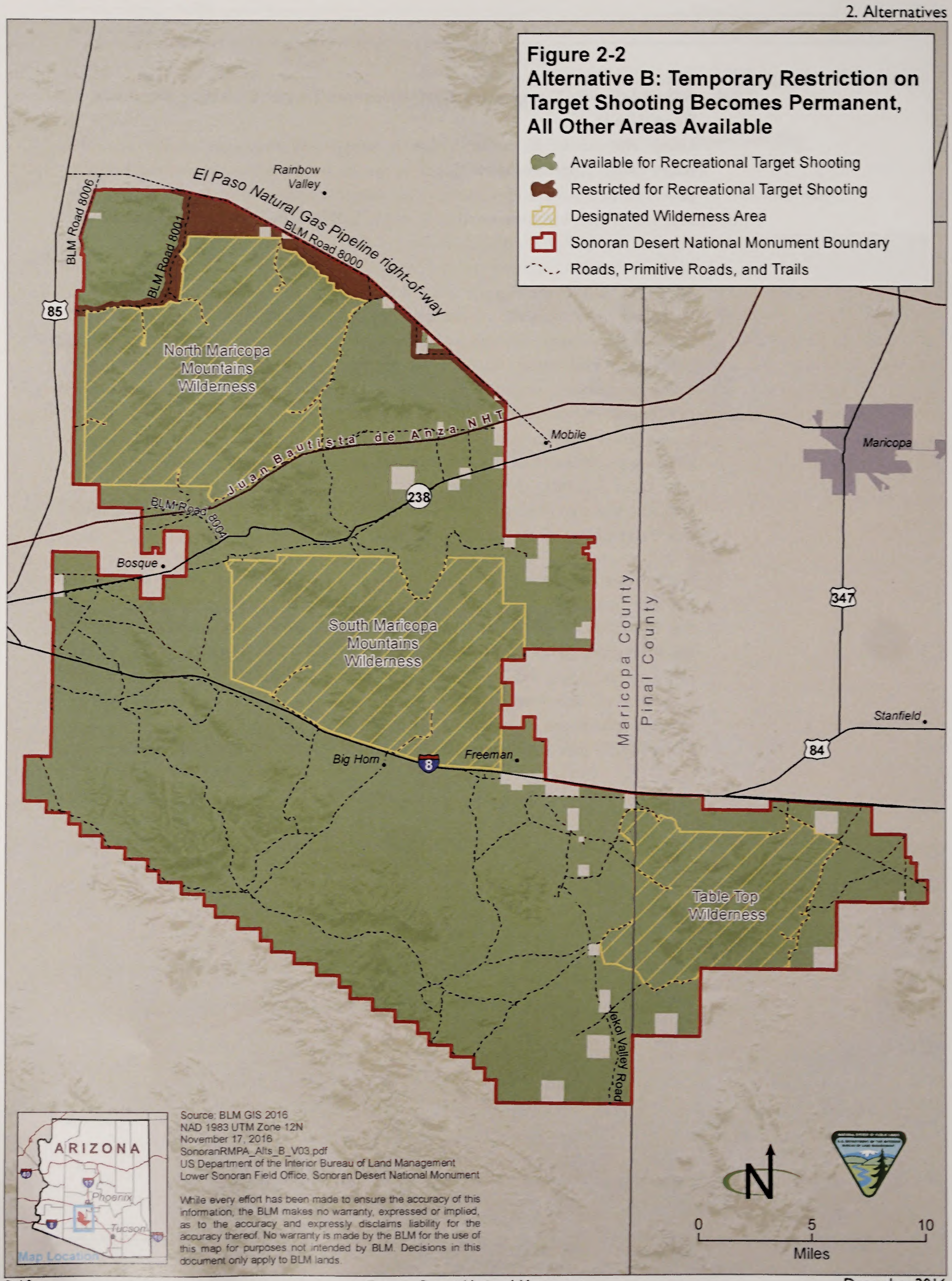
2.2.4 Alternative B: Temporary Restriction on Target Shooting Becomes Permanent

Under Alternative B, the area that is temporarily restricted under the 2015 court order (approximately 10,100 acres in the decision area) would become permanently restricted for recreational target shooting in the land use plan. The restriction area is on the north side of the SDNM along the El Paso Natural Gas Pipeline ROW that parallels BLM Road 8000. It also extends along both sides of BLM Road 8001, adjacent to the wilderness boundary, before terminating at BLM Road 8006 (see **Figure 2-2**, Alternative B). This area had been identified as having concentrated recreational target shooting activity in the SDNM Recreational Target Shooting Analysis (Foti and Chambers 2005), and the temporary restriction is intended to reduce impacts on resources and Monument objects until the RMPA/EIS is completed (81 FR 3468). The court's order and injunction found this temporary closure to be an appropriate temporary measure "that will limit the damage that recreational shooting is inflicting on Monument objects, including but not limited to damage to animals and their habitats, protected plants and vegetation, sites of historic or archeological significance, and areas used by the public" until the BLM completes new recreational target shooting decisions.

Under this alternative, recreational target shooting would continue to be available in all areas outside the restriction area. This alternative would analyze the availability of recreational target shooting activities in all remaining areas of the Monument. The BLM would monitor the SDNM for impacts related to the recreational target shooting allowed under this alternative and apply mitigation measures as identified in the monitoring and mitigation framework plan to protect Monument objects and meet the goals and objectives in the existing SDNM ROD (see **Appendix B**).

Figure 2-2
Alternative B: Temporary Restriction on Target Shooting Becomes Permanent, All Other Areas Available

- Available for Recreational Target Shooting
- Restricted for Recreational Target Shooting
- Designated Wilderness Area
- Sonoran Desert National Monument Boundary
- Roads, Primitive Roads, and Trails



2.2.5 Alternative C (Agency Preferred): Target Shooting Available in the Desert Back Country Recreation Management Zone

Alternative C, the agency preferred alternative, protects Monument objects and public safety by restricting recreational target shooting in the Juan Bautista de Anza NHT RMZ while continuing to make recreational target shooting available in the Desert Back Country RMZ. Together, these two RMZs, which were established in the 2012 RMP, comprise the entire SDNM.

Recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ. This RMZ was identified in the 2012 RMP to "provide recreation and educational opportunities directed at visitors seeking to discover, tour, and learn about the Juan Bautista de Anza NHT, Arizona history and natural history of the Sonoran Desert" (BLM 2012). This RMZ also includes the Butterfield stage route and the Mormon Battalion Trail. This alternative is consistent with the BLM's mandate to protect these resources and provide the opportunity to experience them in as natural condition possible, and to protect public safety in these popular areas.

Restricting recreational target shooting in the Anza RMZ would also be consistent with the National Park Service's Juan Bautista de Anza NHT Comprehensive Management Plan (the Juan Bautista de Anza NHT Comprehensive Management Plan is not an allocation [i.e., decision] document for the BLM). The Comprehensive Management Plan is intended to:

1) Protect certified trail segments and historic sites from overuse, inappropriate use, and vandalism
2) Identify and protect ethnographic resources (those cultural and natural resources of ongoing significance to contemporary peoples, especially American Indians and Hispanics)
3) Encourage uses of adjacent lands that complement the protection and interpretation of trail resources
4) Encourage research to improve knowledge, understanding, and appreciation of the trail and related resources and their significance in history (NPS 1996)

The Juan Bautista de Anza NHT RMZ is the most heavily visited area in the SDNM. As such, restricting recreational target shooting in this area would also address visitor safety concerns.

Recreational target shooting would continue to be available in the Desert Back Country RMZ (approximately 433,600 acres; see **Figure 2-3**, Alternative C). The Desert Back Country RMZ has been identified in the 2012 RMP to "provide recreation opportunities for visitors seeking a remote, undeveloped, back country experience with resource-dependent activities such as hunting, camping, hiking, sightseeing, and four-wheel-drive touring" (BLM 2012). Recreational target shooting is compatible with recreation management and objectives in this

RMZ because it is a dispersed activity, primarily limited to areas near roads, and does not prevent opportunities to engage in the RMZ's other road-dependent recreation activity—four-wheel-drive touring.

The BLM would monitor the SDNM for impacts related to the recreational target shooting allowed under this alternative and apply mitigation measures as identified in the monitoring and mitigation framework plan to protect Monument objects and meet the goals and objectives in the existing SDNM ROD (see **Appendix B**).

Figure 2-3
Alternative C (Preferred): Target Shooting Available in the Desert Back County Recreation Management Zone

- Available for Recreational Target Shooting
- Restricted for Recreational Target Shooting
- Sonoran Desert National Monument planning area
- Designated Wilderness Area
- Roads, Primitive Roads, and Trails

Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
North Maricopa Mountains Wilderness
Juan Bautista de Anza NHT RMZ
Butterfield Pass Trail
Juan Bautista de Anza NHT
Desert Back Country RMZ
Mobile
Maricopa
238
BLM Road 8004
Bosque
South Maricopa Mountains Wilderness
Maricopa County
Pinal County
347
Stanfield
84
Big Horn
8
Freeman
Desert Back Country RMZ
Table Top Wilderness
Vekol Valley Road

ARIZONA
Phoenix
Tucson
Map Location

Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_Alts_C_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 5 10
Miles

2.2.6 Alternative D: Target Shooting Available Outside Designated Wilderness, Lands Managed to Protect Wilderness Characteristics, and the Juan Bautista de Anza NHT RMZ

Under Alternative D, the Juan Bautista de Anza NHT RMZ, three designated wilderness units, and lands managed to protect wilderness characteristics would not be available to recreational target shooting (approximately 319,900 acres; see **Figure 2-4**, Alternative D). Approximately 159,100 acres of designated wilderness within the SDNM would be unavailable to this activity, which would provide protection for wilderness attributes defined in Section 2(c) of the Wilderness Act, including untrammeled, undeveloped, natural, solitude, or primitive unconfined recreation.

Approximately 108,100 acres of lands managed to protect wilderness characteristics would be unavailable to recreational target shooting (there are 154,600 acres that possess wilderness characteristics in the SDNM; see **Section 4.2.7**). Under the 2012 SDNM RMP, the goals, objectives, and management actions for areas to be managed to protect wilderness characteristics should "Retain a high degree of naturalness and offer outstanding opportunities for solitude or primitive, unconfined recreation by reducing impacts on these values while considering manageability and competing resource demands" (BLM 2012). These goals and objectives are consistent with BLM Manual 6320 (Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process).

In addition, recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ (approximately 52,800 acres), which contains the Butterfield Pass Trail, the Mormon Battalion Trail, and the Juan Bautista de Anza NHT. This alternative is consistent with the BLM's mandate to protect these resources and to provide the opportunity to experience them in as natural condition possible, and to protect public safety in these popular areas. The Juan Bautista de Anza NHT is unique because of its national historic trail designation and is subject to the National Park Service's Comprehensive Management Plan (this plan is not an allocation [i.e., decision] document for the BLM). The Comprehensive Management Plan is intended to:

1. Protect certified trail segments and historic sites from overuse, inappropriate use, and vandalism
2. Identify and protect ethnographic resources (those cultural and natural resources of ongoing significance to contemporary peoples, especially American Indians and Hispanics)
3. Encourage uses of adjacent lands that complement the protection and interpretation of trail resources
4. Encourage research to improve knowledge, understanding, and appreciation of the trail and related resources and their significance in history (NPS 1996)

The objective for the Juan Bautista de Anza NHT RMZ in the 2012 SDNM RMP is to "provide recreation and educational opportunities directed at visitors seeking to discover, tour, and learn about the Juan Bautista de Anza NHT, Arizona history and natural history of the Sonoran Desert" (BLM 2012).

The Juan Bautista de Anza NHT RMZ is the most heavily visited area in the SDNM. As such, restricting recreational target shooting in this area would also address visitor safety concerns.

Under this alternative, recreational target shooting would continue to be available in all areas outside the restriction area (166,500 acres). This alternative would analyze the availability of recreational target shooting activities in all remaining areas of the SDNM.

The BLM would monitor the SDNM for impacts related to the recreational target shooting allowed under this alternative and apply mitigation measures as identified in the monitoring and mitigation framework plan to protect Monument objects and meet the goals and objectives in the existing SDNM ROD (see **Appendix B**).

Figure 2-4
Alternative D: Target Shooting Available Outside Designated Wilderness, Areas Managed for Wilderness Characteristics, and the Juan Bautista De Anza NHT RMZ

- Available for Recreational Target Shooting
- Restricted for Recreational Target Shooting
- Sonoran Desert National Monument Boundary
- Designated Wilderness Area
- Roads, Primitive Roads, and Trails

Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
North Maricopa Mountains Wilderness
Juan Bautista De Anza NHT RMZ
Juan Bautista de Anza NHT
Mobile
Maricopa
238
BLM Road 8004
Bosque
South Maricopa Mountains Wilderness
Maricopa County
Pinal County
347
Stanfield
84
Sand Tanks East and West Lands with Wilderness Characteristics
Big Horn
8
Freeman
Javelina Mountains North and South Lands with Wilderness Characteristics
White Hills Lands with Wilderness Characteristics
Table Top Wilderness
Vekol Valley Road

ARIZONA
Phoenix
Tucson
Map Location

Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_Alts_D_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

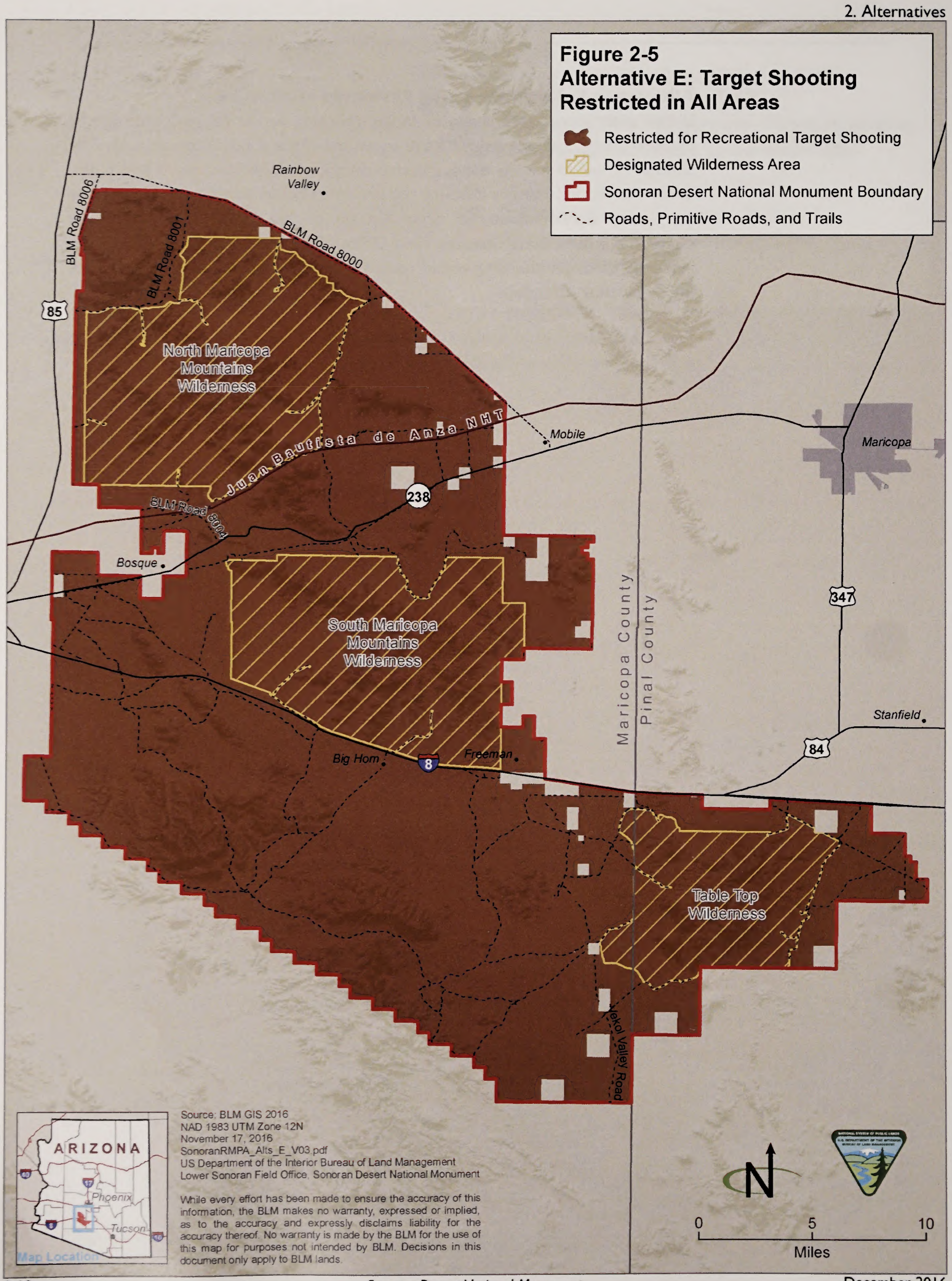
0 5 10
Miles

2.2.7 Alternative E: Target Shooting Restricted in All Areas

Under Alternative E, recreational target shooting would be restricted in the decision area (approximately 486,400 acres; see **Figure 2-5**, Alternative E). This alternative would ensure the greatest protection of the Monument and public safety. Recreational target shooting opportunities would continue to be available on nearby BLM-administered lands outside of the SDNM (such as those elsewhere in the Lower Sonoran Field Office). Restricting the entire SDNM for recreational target shooting would reduce the demand on BLM staff resources for monitoring.

This alternative would analyze the restriction of recreational target shooting activities in all areas of the SDNM and the protection of Monument objects.

Figure 2-5
Alternative E: Target Shooting Restricted in All Areas



2.2.8 Comparison of Available vs. Restricted Areas within the Decision Area

Table 2-1, below, shows a comparison of acreage across all alternatives where recreational target shooting would be available or restricted.

Table 2-1
Alternatives Allocation Summary

Alternative	Acres Available for Recreational Target Shooting	Acres Where Recreational Target Shooting Would be Restricted
Alternative A: No Action Alternative – All Areas Available for Target Shooting	486,400	0 acres
Alternative B: Temporary Restriction on Target Shooting Becomes Permanent	476,300	10,100
Alternative C: Target Shooting Available in the Desert Back Country RMZ	433,600	52,800
Alternative D: Target Shooting Available Outside Designated Wilderness, Lands Managed to Protect Wilderness Characteristics, and the Juan Bautista de Anza NHT RMZ	166,500	319,900
Alternative E: Target Shooting Restricted in All Areas	0 acres	486,400

Source: BLM GIS 2016

2.2.9 Alternatives Considered but Eliminated from Further Study

The following alternative was considered but eliminated from detailed study, because it does not meet the purpose of and need for the RMPA and because it is outside of the technical, legal, or policy constraints of developing this RMPA.

Designating Target Shooting Areas

During public scoping, many commenters requested the designation of recreational target shooting areas. This alternative was eliminated from further study, because designated recreational target shooting areas are inconsistent with the Monument proclamation and conflict with current BLM policy. Per BLM IM 2008-074, Methods for Authorizing Shooting Range Areas on Public Lands, new recreational target shooting range sites cannot be authorized by any type of lease or other land use authorization that does not transfer fee title to the applicant. This type of land use authorization is not permitted in the SDNM, which was created to protect an array of scientific, biological, archaeological, geological, cultural, and historic objects.

2.3 Summary Comparison of Environmental Consequences

Table 2-2, Summary of Environmental Consequences of Alternatives A, B, C, D, and E, presents a comparison summary of impacts from the five management alternatives. **Chapters 4 and 5** provide a more detailed impacts analysis and provide definitions for the intensity of impacts described in this table.

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
*Throughout the planning area, BLM-authorized activities associated with all resources and all resource use programs would be subject to monitoring and mitigation (**Appendix B**).*				
RESOURCES				
Air Quality				
Under Alternative A, continuing ground-disturbing activities resulting from vehicle and OHV travel to recreational target shooting areas would have moderate, direct, site-specific impacts on air quality by increasing levels of particulate matter (fugitive dust) in the short term.	Compared with Alternative A, there may be a slight reduction in vehicle use in the planning area if shooters are displaced to other areas. The magnitude of impacts would be minor to moderate, depending on the amount of vehicle use that is displaced to areas outside the SDNM.	The magnitude of impacts would be minor to moderate, depending on the amount of vehicle use that is displaced to areas outside the SDNM.	Compared with Alternative A, there may be a slight reduction in vehicle use in the planning area if shooters are displaced from 319,900 acres. The magnitude of impacts would be minor to moderate, depending on the amount of vehicle use that is displaced to areas outside the SDNM.	Recreational target shooting would be restricted in the entire SDNM. Compared with Alternative A, Alternative E would result in no impacts on air quality from recreational target shooting in the SDNM.
Cultural and Heritage Resources				
Allowing recreational target shooting on 486,400 acres would not provide additional protections to historic properties and Monument objects such as the Vekol Wash, the Juan Bautista de Anza NHT, the Mormon Battalion Trail, and the Butterfield Overland Stage Route. Noise and potential resource damage associated with	Although there would be 10,100 fewer acres available to this activity compared with Alternative A, the proposed restricted area has been previously disturbed by recreational target shooting. Alternative B does not provide additional protections to historic properties or to uninventoried and unevaluated cultural	By restricting recreational target shooting on 52,800 more acres than Alternative A, implementation of Alternative C would provide additional protections and reduce the risks of impacts on historic properties, cultural resources, trail resources, and associated settings. For example, the restriction area under	By restricting recreational target shooting on 319,900 more acres than Alternative A, implementation of Alternative D would provide additional protections and reduce the risks of impacts on historic properties, cultural resources, trail resources, and associated settings. Among the restricted areas to	There would be no potential impacts on cultural resources from recreational target shooting as an authorized activity because recreational target shooting would be restricted in the entire Monument (486,400 acres). However, as under other alternatives, there would continue to be areas previously disturbed

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
recreational target shooting throughout the SDNM would be inconsistent with resolving threats and conflicts from natural and human-caused degradation on the integrity of historic properties and uninventoried or unevaluated cultural resources in the SDNM.	resources and Monument objects, such as the Vekol Wash, the Juan Bautista de Anza NHT, the Mormon Battalion Trail, and the Butterfield Overland Stage Route.	Alternative C has petroglyph sites within its boundaries. The NHT also has additional management goals outlined in the NPS's Comprehensive Management Plan addressing protection for trail segments, archaeological sites, ethnographic resources, adjacent properties, research, and interpretation (NPS 1996). These restrictions would be consistent with protection criteria for Monument objects and CMP management goals for the Juan Bautista de Anza NHT, as recreational target shooting would be restricted in the Juan Bautista de Anza NHT.	recreational target shooting, culturally sensitive areas and Monument objects south of I-8 in the Table Top Wilderness and other locations throughout the SDNM would be included.	by recreational target shooting.
Priority Wildlife Species and Habitat				
Sonoran Desert Tortoise				
Moderate direct and indirect impacts affecting 100 percent of habitat (295,100 acres).	Moderate direct impacts and moderate and minor indirect impacts affecting 97 percent of habitat (287,300 acres).	Moderate direct impacts and moderate and minor indirect impacts affecting 90 percent of habitat (264,500 acres).	Minor direct and indirect impacts affecting 18 percent of habitat (53,200 acres).	Negligible direct and indirect impacts affecting 100 percent of habitat (295,100 acres).

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
Desert Bighorn Sheep				
Minor and moderate direct and indirect impacts affecting 100 percent of habitat (159,400 acres).	Minor and moderate direct and indirect impacts affecting 98 percent of habitat (157,000 acres).	Moderate direct and indirect impacts affecting 94 percent of habitat (194,200 acres).	Minor direct and indirect impacts affecting 9 percent of habitat (14,600 acres).	Negligible direct and indirect impacts affecting 100 percent of habitat (159,400 acres).
Mule Deer				
Minor direct and indirect impacts affecting 100 percent of habitat (397,000 acres).	Minor direct and indirect impacts affecting 99 percent of habitat (391,600 acres).	Minor and moderate direct and indirect impacts affecting 97 percent of habitat (383,500 acres).	Minor direct and indirect impacts affecting 34 percent of habitat (135,000 acres).	Negligible direct and indirect impacts affecting 100 percent of habitat (397,000 acres).
Sonoran Pronghorn Antelope				
Minor and moderate direct and indirect impacts affecting 100 percent of habitat (486,300 acres).	Minor direct and indirect impacts affecting 99 percent of habitat (476,200 acres).	Minor direct and indirect impacts affecting 89 percent of habitat (433,500 acres).	Minor direct and indirect impacts affecting 34 percent of habitat (166,500 acres).	Negligible direct and indirect impacts affecting 100 percent of habitat (486,300 acres).
Raptors				
Minor direct and indirect impacts affecting 100 percent of habitat (486,300 acres).	Minor direct and indirect impacts affecting 99 percent of habitat (476,200 acres).	Minor direct and indirect impacts affecting 89 percent of habitat (433,500 acres).	Minor direct and indirect impacts affecting 34 percent of habitat (166,500 acres).	Negligible direct and indirect impacts affecting 100 percent of habitat (486,300 acres).
Other Priority Wildlife Species and Habitats				
Minor and moderate direct and indirect impacts affecting 100 percent of habitat (486,300 acres).	Minor direct and indirect impacts affecting 99 percent of habitat (476,200 acres).	Minor direct and indirect impacts affecting 89 percent of habitat (433,500 acres).	Minor direct and indirect impacts affecting 34 percent of habitat (166,500 acres).	Negligible direct and indirect impacts affecting 100 percent of habitat (486,300 acres).
Wildlife Movement Corridors and Water Catchments				
Minor and moderate direct and indirect impacts affecting 100 percent of movement corridors (100 acres) and 100 percent of	Minor direct and indirect impacts affecting 100 percent of movement corridors (100 acres) and 83 percent of water	Minor direct and indirect impacts affecting 100 percent of movement corridors (100 acres) and 88 percent of water	Minor direct and indirect impacts affecting 100 percent of movement corridors (100 acres) and 58 percent of water	Negligible direct and indirect impacts affecting 100 percent of corridors (486,300 acres) and 100 percent of water

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
water catchments (24 catchments).	catchments (20 catchments).	catchments (21 catchments).	catchments (14 catchments).	catchments (24 catchments).
Soil Resources				
All sensitive soils would continue to be in areas where recreational target shooting could occur, and there would be ongoing minor to moderate impacts on soil health.	Compared with Alternative A, there would be no change in ongoing minor to moderate impacts on soil health except for the 5,500 acres of sensitive soils in the restriction area; impacts on these sensitive soils would cease.	Compared with Alternatives A and B, there would be no change in ongoing minor to moderate impacts on soil health except for the 29,900 acres of sensitive soils in the restriction area; impacts on these sensitive soils would cease.	Compared with Alternatives A, B, and C, there would be no change in ongoing minor to moderate impacts on soil health except for the 140,800 acres of sensitive soils in the restriction areas; impacts on these sensitive soils would cease.	Impacts on soils would be less than those described under Alternative A by a moderate amount, because the SDNM (486,400 acres) would be restricted for recreational target shooting.
Vegetation				
Vegetation Communities				
All acres of each vegetation community would continue to be available to recreational target shooting, since no areas are restricted under this alternative. Therefore, the potential for impacts on vegetation communities, including direct impacts from mechanical damage and indirect impacts from recreational target shooting-caused fires, would continue to occur	Approximately 8,300 acres (5 percent) and 1,800 acres (less than 1 percent) of the creosote bush-bursage and palo verdi/mixed cacti vegetation communities, respectively, would be restricted to recreational target shooting under Alternative B. Because the restricted area under Alternative B currently sees concentrated recreational target shooting use, impacts	Approximately 41,500 acres (24 percent) of the creosote bush-bursage community, 11,100 acres (4 percent) of the palo verdi/mixed cacti community, and 107 miles (11 percent) of the desert wash community would be restricted to recreational target shooting under Alternative C. Impacts are expected to be minor.	Approximately 99,100 acres (56 percent) of the creosote bush-bursage community, 218,800 acres (72 percent) of the palo Verdi/mixed cacti community, 1,200 acres (92 percent) of mid-elevation desert scrub, and 601miles (64 percent) of the desert wash community would be restricted to recreational target shooting under Alternative D. Impacts are expected to be minor.	All acres of vegetation communities (and miles of desert washes) in the SDNM would be located in areas restricted for recreational target shooting under Alternative E. Impacts would be reduced compared with Alternative A and are expected to be negligible.

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
and would be moderate.	would be reduced to minor.			
Special Status Plant Species				
Direct and indirect impacts on most special status plant species and acuña cactus critical habitat are expected to continue to be minor to negligible, since they occur in relatively remote, inaccessible portions of the SDNM that are not popular with recreational target shooters. However, impacts on Tumamoc globeberry are expected to be minor to moderate, as this species occurs in a more accessible location.	Impacts on special status plant species and acuña cactus critical habitat would be the same as those described for Alternative A.	Impacts on special status plant species and acuña cactus critical habitat would be the same as those described for Alternative A.	Most areas supporting special status plants in the SDNM would be restricted for recreational target shooting under Alternative D. Impacts are expected to be minor. An exception is for Tumamoc globeberry, which occurs in areas that would remain available to recreational target shooting; impacts on this species would be the same as described under Alternative A. Approximately 1,200 acres (86 percent) of acuña cactus critical habitat in the SDNM would be located in areas restricted to recreational target shooting under Alternative D. Impacts are expected to be negligible.	All areas supporting special status plants in the SDNM and all acuña cactus critical habitat would be restricted for recreational target shooting under Alternative E. Impacts would be reduced compared with Alternative A and are expected to be negligible.
Monument Vegetation Objects				
Moderate impacts on the saguaro cactus forest vegetation object would	Approximately 8,300 acres (5 percent) and 1,800 acres (less than 1 percent)	Under this alternative, 41,500 acres (24 percent) of the creosote bush-	Under Alternative D, 99,100 acres (56 percent) of the creosote bush-	All Monument vegetation objects would be located in areas restricted for

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
continue to occur if recreational target shooting damaged or killed saguaro cacti via mechanical damage, or if recreational target shooting-started fires resulted in saguaro cactus mortality. Impacts on unique woodland assemblages and Sand Tank Mountains plant assemblages are expected to be minor to negligible given their occurrence in relatively remote, inaccessible portions of the SDNM that are not popular with recreational target shooters.	of the vegetation objects creosote bush-bursage and palo verdi/mixed cacti, respectively, and the saguaro cactus forests in these areas, would be restricted to recreational target shooting. Because the restricted area under Alternative B currently sees concentrated recreational target shooting use, impacts would be reduced to minor. For other vegetation objects, impacts would be as described for Alternative A.	bursage, 11,100 acres (4 percent) of the palo verdi/mixed cacti (and the saguaro cactus forests in these areas), and 107 miles (11 percent) of the desert wash vegetation objects would be restricted to recreational target shooting. Impacts on these objects are expected to be reduced to minor. For other vegetation objects, impacts would be as described for Alternative A.	bursage, 218,800 acres (72 percent) of the palo verdi/mixed cacti, 1,200 acres (92 percent) of mid-elevation desert scrub, and 601 miles (64 percent) of the desert wash vegetation objects would be restricted for recreational target shooting. Impacts on other vegetation objects would be similarly reduced. Impacts would be minor.	recreational target shooting, because the entire SDNM would be restricted for recreational target shooting. Impacts would be reduced compared with Alternative A and are expected to be negligible.
Water Resources				
There would be no change in ongoing minor to moderate impacts on the 4,565 miles of ephemeral surface waters and 23 miles of intermittent surface waters on BLM-administered land available to recreational target shooting.	For the 152 miles of ephemeral surface waters on BLM-administered land restricted to recreational target shooting, the impacts on ephemeral surface waters from recreational target shooting would cease. There would be no	For the 1,009 miles of ephemeral surface waters and 2 miles of intermittent surface waters on BLM-administered land restricted to recreational target shooting, the impacts on surface waters from recreational target shooting would cease.	For the 2,379 miles of ephemeral surface waters and 10 miles of intermittent surface waters on BLM-administered land restricted to recreational target shooting, the impacts on surface waters from recreational target	Impacts from recreational target shooting on ephemeral and intermittent surface waters in the SDNM would cease.

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
	reduction in impacts on intermittent surface waters compared with Alternative A.		shooting would cease.	
Lands Managed to Protect Wilderness Characteristics				
Impacts on an area's naturalness would mostly accrue along roads on the perimeter of lands managed to protect wilderness characteristics due to spent shells, targets, household waste, destroyed or damaged vegetation and rock outcrops, and the unavoidable sound of gunfire. These impacts are expected to be minor, site specific, and short-term. Impacts on an area's naturalness would also occur from the increased risk of wildfire when visitors are participating in recreational target shooting activities due to possible ignitions. These impacts are expected to be minor, localized, and short- to long-term depending on the acreage burnt during a	Impacts would be the same as those described under Alternative A due to the same acreages and areas being available to recreational target shooting on lands managed to protect wilderness characteristics and lands found to possess wilderness characteristics.	Impacts under Alternative C would be the same as those described under Alternative A for lands being managed to protect wilderness characteristics due to the same acreages and areas being available to recreational target shooting. Impacts would be similar, but lesser in degree, as those described under Alternative A for lands found to possess wilderness characteristics, due to 6 percent fewer acres being available for recreational target shooting.	Restricting recreational target shooting on all lands managed to protect wilderness characteristics would result in minor impacts on wilderness characteristics compared with those described under Alternative A. Impacts on an area's apparent naturalness and opportunities for solitude or a primitive and unconfined type of recreation would occur under this alternative due to areas directly adjacent to lands managed to protect wilderness characteristics being available to recreational target shooting. Impacts along the perimeter of lands managed to protect wilderness characteristics	Restricting all areas within and adjacent to lands with wilderness characteristics would provide the most protection to apparent naturalness, opportunities for solitude or a primitive and unconfined type of recreation, and supplemental values out of all the alternatives by making any impacts negligible under this alternative.

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
wildfire and the types of vegetation burned. Impacts on an area's opportunity for solitude or a primitive and unconfined type of recreation would occur from recreational target shooting due to an increased human presence engaging in this activity. These impacts are expected to be minor, localized, and short-term.			would include spent shells, targets, household waste, destroyed or damaged vegetation and rock outcrops, and the unavoidable sound of gunfire. These impacts are expected to be minor, site specific, and short-term. Impacts under Alternative D would be similar, but lesser in degree, as those described under Alternative A for lands found to possess wilderness characteristics, due to 76 percent fewer acres being available for recreational target shooting. All impacts in these areas are expected to be minor.	
Wildfire Management				
Alternative A would have the highest potential for human-caused fires. However, this risk is negligible or minor based on past trends. Impacts on native vegetation communities not adapted	Alternative B has the second-highest potential for human-caused fires. Potential direct and indirect impacts would be similar to those described under Alternative A, as 2 percent of the decision	Potential direct and indirect impacts would be similar to those described under alternative A, as 11 percent of the decision area would be restricted from recreational target shooting. The potential for	The potential for human-caused fires and fuels loading from activities associated with recreational target shooting would be reduced by approximately 66 percent compared with	The potential for the lowest direct and indirect impacts from wildfire as a result of recreational target shooting would occur under this alternative. Fire suppression resources

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
to fire would be minor as wildfires within the planning area are generally small (less than 1 acre in size) due to sparse vegetation to carry wildfires.	area would be restricted from recreational target shooting.	human-caused fire from management of the Desert Back Country RMZ would be marginally lower, as management of the RMZ would restrict recreational target shooting, resulting in fewer visitors. Wildfire impacts on non-fire-adapted vegetation communities would be expected to be minor as wildfires within the planning area are generally small (less than 1 acre in size) due to sparse vegetation that limit wildfire spread.	Alternative A. Fire suppression would respond to fewer fires. Wildfire impacts on non-fire-adapted vegetation communities would be expected to be minor as wildfires within the planning area are generally small (less than 1 acre in size) due to sparse vegetation that limit wildfire spread.	would respond to fewer human-caused fires compared with Alternative A. Wildfire impacts on non-fire-adapted vegetation communities would remain minor as wildfires within the planning area are generally small (less than 1 acre in size) due to sparse vegetation that limit wildfire spread.
RESOURCE USES				
Livestock Grazing				
All 157,100 acres of allotments available to grazing would continue to be available for recreational target shooting, with direct impacts on livestock grazing—such as unwanted animal dispersion, harassment, injury of animals, or damage to	Approximately 9,400 acres with available grazing would be protected from potential disturbance from recreational target shooting. As a result, the level of impacts would be slightly reduced as compared with Alternative A due to the reduction in areas available to	Approximately 9,500 acres with available grazing would become restricted to recreational target shooting. The type of impacts from recreational target shooting on livestock grazing would be the same as under Alternative A, but the intensity of impacts would be slightly reduced due to	Approximately 103,500 acres with available grazing throughout the decision area would become restricted to recreational target shooting. The type of impacts from recreational target shooting on livestock grazing would be the same as under Alternative A,	Impacts on livestock grazing from recreational target shooting would be eliminated for all 157,100 acres with available grazing.

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
range improvements—and indirect impacts such as removal of forage resources. Impacts would likely be concentrated in areas where recreational target shooting has occurred in the past.	recreational target shooting. Making a portion of the decision area with a history of recreational target shooting restricted to recreational target shooting would reduce impacts in this area, but disturbance may be redirected to other portions of the decision area.	the reduction in areas available to recreational shooting.	but the intensity of impacts would be reduced due to the reduction in areas available to recreational target shooting.	
Recreation Management				
Impacts would be minor to moderate. Noise and resource damage associated with recreational target shooting would continue to be in conflict with the principal recreational activities in the SDNM Extensive Recreation Management Area (ERMA). In the short term, noise from recreational target shooting would disturb the remote character of the SDNM and could moderately decrease the BLM's ability	Impacts under Alternative B would be moderate to major and similar to those described under Alternative A except that restricting recreational target shooting in the 10,100-acre area north of the North Maricopa Mountains Wilderness would affect recreational activities and experiences elsewhere in the SDNM, notably the Juan Bautista de Anza NHT RMZ. This is because the restriction would displace shooters, some of whom would	Impacts under Alternative C would be minor to moderate. Restricting recreational target shooting in the Juan Bautista de Anza NHT RMZ would eliminate the potential for conflicts with hiking, camping, and other recreational activities in the RMZ. In addition, the restriction would increase the BLM's ability to meet visitor expectations and to provide safe, developed, and educational opportunities consistent with the ERMA objectives	Impacts under Alternative D would be minor to moderate. Restricting recreational target shooting on 319,900 acres would eliminate the potential for conflict with other recreational activities in these areas. Compared with Alternative A, Alternative D would better preserve Monument objects related to recreation management, and it would reduce the potential for resource damage, debris, and noise from recreational target	Impacts under Alternative E would be reduced by a negligible to moderate amount. Alternative E would eliminate the potential for recreational target shooting to conflict with other recreational activities or impact the principal activities in the SDNM ERMA.l Impacts would be most noticeable in the Juan Bautista de Anza NHT RMZ and the northwestern corner of the SDNM along El Paso Natural Gas Company pipeline road and BLM

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
to provide visitors with safe, high-quality recreational and educational experiences. In the long term, safety risks and resource damage would moderately diminish visitors' ability to experience the Juan Bautista de Anza NHT and the natural history of the Sonoran Desert, two of the SDNM's principal objects.	engage in recreational target shooting in the RMZ. The types of impacts on other recreational activities and experiences in the RMZ would be similar to those described under Alternative A, but the intensity and frequency would be greater because there would likely be more recreational target shooting as a result of shooter displacement.	and Monument designation proclamation. This is because there would be less safety risk, noise, litter, and resource damage from recreational target shooting, thereby increasing visitors' ability to successfully interpret historic and natural resources in the RMZ. Compared with current management under Alternative A, the most notable improvements in visitor satisfaction would be for those engaging in nonmotorized, quiet recreational activities such as hiking, sightseeing, and camping.	shooting to conflict with the objectives of the SDNM ERMA.	Roads 8000 and 8001.
Recreational Target Shooting				
Alternative A would maintain recreational target shooting opportunities throughout the entire Monument. Shooters would experience no change in their ability to engage in the activity, and impacts	Although the 10,100-acre restriction under Alternative B would only apply to 2 percent of the decision area, the result would be moderate to major impacts on recreational target shooting opportunities,	Recreational target shooting opportunities would be eliminated in the 52,800-acre Juan Bautista de Anza NHT RMZ, but it would be maintained elsewhere, including popular areas along El Paso Natural Gas	Although Alternative D would increase the portion of the decision area restricted to recreational target shooting by 267,100 acres, impacts would be similar to those described under Alternative C. This is	Alternative E would restrict recreational target shooting in the entire SDNM, which would eliminate opportunities for visitors to participate in recreational target shooting. Visitors seeking recreational target

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
would be negligible.	because the area is easily accessed via El Paso Natural Gas Company pipeline road and BLM Road 8001 and is within an hour drive of several regional population centers.	Company pipeline road and BLM Roads 8000 and 8001 in the northwestern portion of the SDNM. Implementation of Alternative C would also maintain opportunities along roadways directly south of SR 238. Accordingly, Alternative C would result in minor impacts on recreational target shooting opportunities compared with Alternative A, because several easily accessible areas would remain available.	because wilderness areas and lands managed to protect wilderness characteristics prohibit motorized vehicle access and are, therefore, not popular recreational target shooting areas.	shooting experiences would be required to seek areas outside of the SDNM. Accordingly, Alternative E would result in a major, direct, long-term impact on recreational target shooting in the SDNM.
Travel Management				
The demand for access and associated impacts would continue to be greatest on roadways providing access to popular recreational target shooting areas that are within one hour of population centers.	Impacts under Alternative B would be similar to those described under Alternative A except in the nearly 10,100 acres of the decision area along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001 where recreational target shooting would be restricted.	There would be 44 fewer miles of designated routes for motorized vehicles in available recreational target shooting areas. If the BLM approves the SDNM Juan Bautista de Anza NHT RMZ Recreation Plan that would include opening most routes to motorized travel that were	Although Alternative D would restrict recreational target shooting on 267,100 more acres than Alternative C, impacts under the two alternatives would be similar. This is because the additional restrictions under Alternative C would apply to areas that are closed to motorized travel and are	Restricting recreational target shooting throughout the entire SDNM would eliminate motor vehicle congestion associated with recreational target shooting and safety related access limitations for pedestrians and equestrians, because all 342 miles of designated

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
		temporarily closed in 2008, Alternative C would result in a moderate improvement in access and safety in the RMZ compared with Alternative A. In particular, restricting recreational target shooting adjacent to roadways in the RMZ would reduce congestion and improve access for nonmotorized travelers.	not easily accessible for recreational target shooting. Under Alternative D, the routes open to motorized use in available recreational target shooting areas would be 45 miles less than under Alternative A and 1 mile less than under Alternative C. Accordingly, impacts on travel management would be nearly the same as under Alternative C in these areas.	routes open to motorized vehicles would be in restricted recreational target shooting areas.
SPECIAL DESIGNATIONS				
National Conservation Lands				
As described in detail in **Section 3.4.1,** National Conservation Lands, the purpose of the SDNM is to protect and manage the SDNM's natural, geologic, and cultural resources (i.e., SDNM objects) for long-term conservation and to further our knowledge and understanding of such resources through scientific research and interpretation. For analysis of impacts from recreational target shooting on these objects, refer to the following sections: Cultural and Historic Resources, Priority Wildlife Species and Habitat, Soil Resources, and Vegetation.				
Congressional Designations				
Recreational target shooting would continue to result in direct destruction of objects and disturbance of landscapes in wilderness from gunfire and trampling at recreational target shooting sites. These	Impacts on wilderness would be the same as those described under Alternative A except in the northern perimeter of the North Maricopa Mountains Wilderness, where direct impacts on visitors' opportunities for	Under Alternative C, indirect impacts from noise and travel related to motor vehicles accessing recreational target shooting sites would be similar to those under Alternative A, except the restriction in the Juan	Restricting 159,100 acres (100 percent) of the wilderness areas under Alternative D would eliminate potential direct impacts on wilderness qualities from recreational target shooting in the wilderness areas.	Restricting 100 percent of the planning area under Alternative E would eliminate all direct and indirect impacts on wilderness qualities from recreational target shooting in the North Maricopa Mountains,

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
direct impacts could continue to occur anywhere in the three wilderness areas, but they would likely occur in the perimeter areas easily accessed with motor vehicles. Changes to the landscape would continue to result in site-specific to localized, long-term, minor, direct impacts on visitors' opportunities to experience natural, and untrammeled and undeveloped wilderness. Impacts on the Juan Bautista de Anza NHT corridor from recreational target shooting would continue to include direct loss, damage, or destruction of the physical environment of the trail corridor, including site or historic trail elements, artifacts, and associated cultural sites. This would result in site-specific to localized, long-term, moderate, direct impacts	solitude, or primitive and unconfined recreation would likely be mitigated to localized, short-term, and minor. The impacts on the physical environment and historic landscape setting of the NHT corridor would be the same as those described under Alternative A. Recreational target shooting would continue to diminish visitors' opportunities to experience the historic landscape settings.	Bautista de Anza NHT RMZ along the eastern and southern boundaries of the North Maricopa Mountains Wilderness would eliminate motor vehicle travel to recreational target shooting sites in that area. This would result in localized, short-term, moderate, indirect impacts on visitors' opportunities for solitude or primitive and unconfined recreation, except in the eastern and southern perimeter of the wilderness, where impacts would likely be mitigated to localized, short-term, and minor. Restricting recreational target shooting in the 52,800-acre RMZ would eliminate the potential for noise, resource damage, and safety concerns in the NHT corridor associated with recreational target shooting. Compared with Alternative A, this	Compared with Alternative A, Alternative D would preserve the wilderness qualities and reduce the potential for impacts on visitors' opportunities to experience wilderness qualities. The impacts on the physical environment and historic elements of the NHT corridor would be the same as those described under Alternative C. Visitors' opportunities to experience the historic landscape setting of the NHT corridor would be enhanced.	South Maricopa Mountains, and Table Top Wilderness areas. Compared with Alternative A, Alternative E would reduce landscape disturbance from gunfire and associated activities the most, resulting in site-specific to localized, long-term, negligible, direct, and indirect impacts on opportunities for visitors to experience naturalness, and untrammeled and undeveloped wilderness. Because the entire planning area would be restricted, mitigation measures to protect the NHT corridor from gunfire and other recreational target shooting-related activities would not need to be implemented.

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
on the physical environment and historic setting.		alternative would result in observable improvements in protection of the physical environment and opportunities for visitors to experience the historic setting of the NHT corridor. Restricting the RMZ would enhance the historic setting, resulting in localized, negligible to minor, long-term, direct, and indirect impacts on visitors' opportunities to experience the NHT corridor's historic setting.		
SOCIAL AND ECONOMIC				
Tribal Interests				
Alternative A would result in the highest potential for impacts on cultural resources, historic properties, and Monument objects. In particular, noise and potential resource damage associated with recreational target shooting throughout the SDNM would continue to be inconsistent with resolving threats and	The potential for impacts under Alternative B would be similar to Alternative A throughout most of the SDNM. However, restrictions on recreational target shooting on 10,100 acres in the decision area may displace this activity to other areas with road access, such as the nearby Juan Bautista de Anza	Alternative C would provide additional protections and reduce the risks of impacts on the integrity and settings of cultural resources, historic properties, and Monument objects compared with Alternative A. In particular, restricting recreational target shooting within the Juan Bautista de Anza NHT RMZ would help protect	Alternative D would provide additional protections and reduce the risks of impacts compared with Alternative A. Among the areas restricted to recreational target shooting, culturally sensitive areas and Monument objects south of I-8 in the Table Top Wilderness and other locations throughout the	Alternative E would eliminate potential impacts from recreational target shooting as an authorized activity.

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
conflicts from natural and human-caused degradation on the integrity and setting of tribal interests, tribal resources, sacred sites, or traditional use areas.	NHT RMZ or to other areas where the risk of impacts on the integrity and setting of tribal interests, tribal resources, sacred sites, or traditional use areas may increase.	its archaeological and historic sites, including sensitive resources and Monument objects. The NHT also has additional management goals outlined in the NPS's CMP addressing protection for trail segments, archaeological sites, ethnographic resources, adjacent properties, research, and interpretation (NPS 1996). The restrictions under Alternative C would be consistent with protection criteria for Monument objects and the CMP management goals for the Juan Bautista de Anza NHT.	SDNM would be included. Restrictions on recreational target shooting would be concentrated in the areas described above; potential impacts in the approximately 166,500 acres available to recreational target shooting in the decision area would be similar to those under Alternative A.	
Hazardous Materials and Public Safety				
There would continue to be negligible to moderate impacts. All areas in the SDNM would continue to be available for recreational target shooting, resulting in the greatest risk of being	Impacts associated with the risk of injury from gunfire would be similar to those under Alternative A, but they would be reduced in the 10,100 acres where recreational target shooting is restricted. This	By restricting recreational target shooting in the Juan Bautista de Anza NHT RMZ, there would be a moderate reduction in the risk of the public being injured by gunfire over the short and long term. This	Impacts would be similar to those described under Alternative C except that the risk of injury from gunfire would be further reduced by restricting recreational target shooting in wilderness and	Restricting recreational target shooting in the entire decision area would eliminate the risk of the public being injured by gunfire associated with recreational target shooting over the short

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
injured by gunfire over the short and long term. Instances of solid waste dumping associated with recreational target shooting would be expected to continue over the short and long term and would be concentrated at areas where waste is currently common, including along the El Paso Natural Gas Company pipeline road and smaller sites adjacent to SR 238 and Vekol Valley Road.	restriction would have a negligible short- and long-term impact on the risk of injury, because it does not overlap any areas that receive high visitation. There would be a moderate reduction in solid waste dumping associated with recreational target shooting, because the area where recreational target shooting would be restricted is one of the primary locations (i.e., along the El Paso Natural Gas Company pipeline road) for recreational target shooting-related dumping and litter.	is because this area receives the most public visitation of any area in the SDNM. There would be a minor reduction in solid waste dumping associated with recreational target shooting, because the area where recreational target shooting would be restricted encompasses some, but not all, of the primary locations in the SDNM where recreational target shooting-related dumping and litter has been observed.	lands managed to protect wilderness characteristics. Impacts on solid waste would be similar to those under Alternative C, because there is low visitation in wilderness and lands managed to protect wilderness characteristics, and the lack of motorized access makes it difficult to introduce large volumes of waste in these areas.	and long term. It would also eliminate solid waste dumping associated with recreational target shooting over the short and long term.
Social and Economic Conditions and Environmental Justice				
Social and Economic Conditions				
Issues related to recreational target shooting raised during public scoping include household waste and deteriorating resource conditions in areas with recreational target	Although the 10,100-acre restriction area represents a small percentage of the SDNM, it covers an area currently popular for recreational target shooting because of good motor vehicle access and	Alternative C would result in minor impacts on recreational target shooting opportunities and related social and economic impacts compared with Alternative A, because several easily	Alternative D would increase the portion of the SDNM restricted to recreational target shooting, and impacts would be similar to those described under Alternative C. This is	Recreational target shooters would be required to find a substitute area for this activity outside of the SDNM, with potential minor economic impacts if some recreational target

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
shooting, as well as public safety concerns. These existing issues could be expected to increase as participation increases. Associated social effects, such as conflicts among users, would continue and possibly escalate. Should these issues continue, recreational experiences, particularly those that value natural landscapes and viewsheds, would be increasingly impacted by recreational target shooting. As a result, visitation and related spending by hikers, sightseers, and other recreational users may decline. Conflicts with other users would be greatest where recreational target shooting occurs near developed recreation sites (e.g., campgrounds, trails and trailheads, and parking areas) and in heavily visited areas.	proximity to population areas. Therefore, there is potential for minor economic impacts. Opportunities for recreational target shooting would remain available in other portions of the planning area, lessening overall impacts if displaced shooters engage in recreational target shooting in these areas. In addition, restrictions on recreational target shooting would enhance opportunities and social and economic contributions from other activities.	accessible areas would remain available. Additionally, making portions of the planning area unavailable to recreational target shooting would support enhancement of recreational experiences for other activities and economic and social contributions from these uses.	because wilderness areas and lands managed to protect wilderness characteristics prohibit motorized vehicle access and are, therefore, not commonly used for recreational target shooting, and because other recreational target shooting opportunities would be maintained within the planning area. As under Alternative B, restrictions on recreational target shooting would enhance opportunities and social and economic contributions from other activities.	shooters stop engaging in this recreational activity. The intensity of social and economic impacts would be determined by shooters moving to and enjoying alternative locations for recreational target shooting in the socioeconomic study area (e.g., Palo Verde Hills, Seven-Mile Mountain, and the Sierra Estrella). In addition, restricting recreational target shooting in the SDNM would support enhanced recreational experiences for other users who have conflicts with recreational target shooting, resulting in economic and social contributions from these activities.

Table 2-2
Summary of Environmental Consequences of Alternatives A, B, C, D, and E

Alternative A (No Action)	Alternative B	Alternative C (Preferred)	Alternative D	Alternative E
Environmental Justice				
No low-income or minority populations were identified in the planning area at the county level as defined by CEQ guidelines. Low-income and minority populations have been identified at the community level. The proposed management actions are not anticipated to result in disproportionate adverse impacts on these communities. This is due to the fact that changes in the level of recreational shooting would result in dispersed impacts throughout the local area on all communities and populations. As a result, environmental justice is not specifically analyzed under each alternative heading below. The BLM has performed outreach and consultation with federally recognized tribes in the study area. These activities would continue under each alternative.				
Continuing to manage the entire SDNM as available for dispersed recreational target shooting could restrict the ability of some tribes to engage in traditional cultural practices or visit traditional cultural places. These impacts would occur throughout the SDNM where such practices occur or traditional cultural places are located. Given the scale and frequency of recreational target shooting in the SDNM, effects would be greater than under any other alternative.	Compared with Alternative A, there would be a negligible improvement in tribes' ability to engage in traditional cultural practices or visit traditional cultural places under Alternative B because a small area (10,100 acres) would be restricted for recreational target shooting.	Compared with Alternatives A and B, tribes' ability to engage in traditional cultural practices or visit traditional cultural places would be improved under Alternative C because 52,800 acres in the Anza RMZ would be restricted for recreational target shooting.	Compared with Alternatives A, B, and C, tribes' ability to engage in traditional cultural practices or visit traditional cultural places would be improved under Alternative D because 319,900 acres would be restricted for recreational target shooting.	The impact of recreational target shooting on tribes' ability to engage in traditional cultural practices or visit traditional cultural places in the SDNM would be eliminated under Alternative E.

Chapter 3

TABLE OF CONTENTS

Chapter Page

3. AFFECTED ENVIRONMENT 3-1

3.1 Introduction 3-1
3.2 Resources 3-2
3.2.1 Air Quality 3-2
3.2.2 Cultural and Heritage Resources 3-5
3.2.3 Priority Wildlife Species and Habitat 3-8
3.2.4 Soil Resources 3-18
3.2.5 Vegetation Resources 3-24
3.2.6 Water Resources 3-31
3.2.7 Lands with Wilderness Characteristics 3-32
3.2.8 Wildfire Management 3-35
3.3 Resource Uses 3-43
3.3.1 Livestock Grazing 3-43
3.3.2 Recreation Management 3-46
3.3.3 Recreational Target Shooting 3-55
3.3.4 Travel Management 3-57
3.4 Special Designations 3-63
3.4.1 National Conservation Lands 3-63
3.4.2 Congressional Designations 3-67
3.5 Social and Economic Conditions 3-71
3.5.1 Tribal Interests 3-71
3.5.2 Hazardous Materials and Public Safety 3-72
3.5.3 Socioeconomics and Environmental Justice 3-74

TABLES

Page

3-1 Special Status Species and Priority Species 3-9
3-2 Vegetation Communities 3-24
3-3 Special Status Plant Species 3-27
3-4 Watersheds 3-31
3-5 Lands Managed to Protect Wilderness Characteristics 3-34
3-6 Historical Fire Regimes, Based on Fire Frequency and Severity 3-37
3-7 Current Fire Regime Condition Classes by Vegetative Community 3-39
3-8 Wildland Fires 2009-2016 3-42
3-9 Grazing Allotment Information 3-46
3-10 Visitor Use in the SDNM 3-47
3-11 Special Recreation Permits in the SDNM 3-52
3-12 OHV Travel Management Allocations 3-60
3-13 Route Designations 3-61
3-14 Sonoran Desert National Monument Objects 3-64
3-15 Special Designations in the Planning Area 3-67
3-16 Employment in Travel and Tourism in 2014 3-76
3-17 Visitor Use in the SDNM 3-78
3-18 National Forest Visitor Spending Profiles in 2003 3-78

3-19 National Average Spending per Shooter in 2011 3-79
3-20 Individuals and Families Living Below Poverty in 2014 3-82
3-21 Household Income Distribution in 2014 3-82
3-22 Poverty in 2014 for Key Communities 3-82
3-23 County-Level Population by Race/Ethnicity in 2014 3-83
3-24 Key Community Race/Ethnicity in 2014 3-83

FIGURES

Page

3-1 Air Pollutant Nonattainment Areas 3-4
3-2 Priority Plant and Animal Species 3-12
3-3 Soil Types 3-19
3-4 Soil Wind Erosion Potential 3-23
3-5 Vegetation Communities 3-25
3-6 Fire Regime Groups 3-40
3-7 Fire Regime Condition Class 3-41
3-8 Livestock Grazing Allotments 3-45
3-9 Extensive Recreation Management Area and BLM Recreation Sites 3-51
3-10 Inventoried Recreation Impact Sites 3-54
3-11 Travel Management 3-58

CHAPTER 3
AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the environment in the planning area that could be affected by actions proposed under the alternatives described in **Chapter 2**. While the BLM is responsible for managing only BLM-administered lands in the planning area (that is, the SDNM decision area), proposed decisions may affect environmental components outside the decision area. Therefore, unless indicated otherwise, discussion and analysis in this section encompasses the planning area as a whole.

The environmental components potentially impacted consist of resource and management activities discussed in **Section 3.2**. The foreseeable environmental impacts of the alternatives on these same resource and management activities are described in **Chapter 4**, Environmental Consequences.

Several resources were not brought forward for consideration in this RMPA/EIS, either because they are not present in the planning area or because they were determined to be unaffected by implementation of the alternatives presented in **Chapter 2**:

- Cave and Karst Resources. There are no cave or karst resources in the planning area.
- Climate Change. Management of recreational target shooting in the planning area has no measurable impact on climate change or greenhouse gas emissions.
- Paleontological Resources. The SDNM does not contain sedimentary rock units anticipated to contain fossils.
- Visual Resources. The management of recreational target shooting in the planning area has no relationship to visual resource

management. Litter and solid waste is addressed under Hazardous Materials and Public Safety.

- Wild Horses and Burros. There is no herd management area in the SDNM; therefore, wild horse and burro management would not impact or be impacted by recreational target shooting.
- Lands and Realty. Management of recreational target shooting in the planning area would not affect existing ROWs or other lands and realty actions.
- Energy and Minerals. The SDNM is withdrawn from locatable mineral entry and managed as closed to fluid mineral leasing. There are three mineral materials sites near Interstate 8, but those sites are not expected to impact or be impacted by recreational target shooting.

3.2 RESOURCES

3.2.1 Air Quality

Regulatory Framework

The BLM's role in air resource management is to ensure that agency activities comply with applicable air quality standards and that BLM-authorized leases and permits include conditions and stipulations that require compliance with applicable air quality rules and standards. This is done through interagency coordination, participation in state implementation plans, environmental impact analyses as required by NEPA, and adaptive management practices outlined in BLM Air Resources Manual 7300 and the 2015 BLM Air Resources Management Strategy.

Clean Air Act Land Classifications

Under the federal Clean Air Act (CAA), national parks 6,000 acres or larger and wilderness areas 5,000 acres or larger existing in 1977 were designated as Class I. These areas are granted special protections under the CAA. There are no Class I areas in the planning area. Other wilderness areas and national parks, including those designated after 1977, are classified as Class II, and land managers are limited to less strict protection of air quality. State and local air quality planning and permitting agencies give such places special consideration under the CAA through prevention of significant deterioration criteria, even though they do not qualify as Class I areas. In the planning area, three wilderness areas have been designated as Class II: the Table Top, North Maricopa Mountains, and South Maricopa Mountains wilderness areas.

National Ambient Air Quality Standards

The CAA requires the US EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants harmful to public health or the environment. It also establishes two types of national standards: primary standards to protect health and secondary standards to protect welfare.

The EPA sets NAAQS for six principal or "criteria" pollutants: carbon monoxide (CO), lead, nitrogen dioxide (NO_2), one-hour ozone (O_3), sulfur dioxide (SO_2), and particulate matter smaller than 10 micrometers in effective diameter (PM_{10}).

Geographic areas are designated as attainment, nonattainment, or unclassified for each of the criteria pollutants with respect to NAAQS. An area is designated as attainment if pollutant concentrations meet the NAAQS; as nonattainment if pollutant concentrations exceed the NAAQS; or as unclassified if the status of attainment has not been verified through data collection. For planning and permitting purposes, unclassified areas are treated as attainment areas.

Both Maricopa and Pinal Counties contain some areas that are designated as nonattainment with respect to PM_{10}, SO_2, CO, and O_3 (EPA 2015). These nonattainment areas are shown on **Figure 3-1**, Air Pollutant Nonattainment Areas.

All projects and program components in nonattainment areas must be in compliance with Section 176 (c) of the CAA, as amended, and regulations under 40 CFR, Part 93, Subpart W, concerning conformity of general federal actions to the applicable state implementation plan for nonattainment and maintenance areas. Under those authorities, "no department, agency, or instrumentality of the federal government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable implementation plan." Therefore, a federal agency must determine that a federal action conforms to the applicable implementation plan before it is done.

Emission Sources

Vehicle travel on paved roads, especially in the metropolitan Phoenix area, represents the largest single emission source surrounding the planning area which contributes to the formation of O_3. Ozone is produced by chemical reactions involving naturally occurring gases and gases from pollution sources. Ozone production reactions primarily involve hydrocarbon and nitrogen oxide gases, as well as ozone itself, and all require sunlight for completion. Fossil fuel combustion is a primary source of pollutant gases that lead to tropospheric ozone production (NOAA 2010). Other major contributors to emissions near the planning area are traffic on interstates and other major thoroughfares; these are Interstates 10 and 8 (I-10 and I-8); US Highway 89; and State Routes (SR) 85 and 238. Common sources of PM_{10} pollution are particulate matter carried onto paved roadways from wind and rain and soil tracked onto highways by vehicles entering from unpaved roads.

In the decision area, most vehicle routes used to access recreational target shooting areas are unpaved. Travel on unpaved routes results in particulate emissions, or fugitive dust. Although fugitive dust is not included in air quality evaluations, it can affect local air quality, especially in areas of concentrated travel on unpaved roads and during periods of high winds.

Figure 3-1
Air Pollutant Nonattainment Areas

- Sulfur Dioxide (S02) 2010 Standard
- Carbon Monoxide (CO) 1971 Standard
- Particulate Matter (PM10) 1987 Standard
- Lead (Pb) 2008 Standard
- 8-hour Ozone (O3) 2008 Standard
- Sonoran Desert National Monument Boundary

Mohave County
La Paz County
Yavapai County
Gila County
Yuma County
Maricopa County
Pinal County
Pima County
Cochise County
Santa Cruz County
MEXICO
Phoenix
Tucson
Juan Bautista de Anza NHT
93
89
17
60
87
10
347
238
8
85
70
77
19

Map Location
ARIZONA

Source: EPA GIS 2015
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_AE_AirNonattainment_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 25 50
Miles

The largest source of particulate matter emissions in the planning area and adjacent lands is surface-disturbing activities, including construction, mining, and off-highway (recreation-related) travel. State and local nonpoint-source rules guide these activities. Emissions from agricultural facilities, mostly in the form of particulates, can also affect local air quality due to arid soil conditions, particularly during field tilling and harvest. While these non-permitted stationary emission sources are not tracked as closely as permitted sources, agricultural operations must also comply with applicable federal, state, and local regulations.

The northern portion of the decision area is affected by the automobile emissions CO, CO_2, SO_2, NO_2, $PM_{2.5}$, and PM_{10}. This is due to the area's road density and proximity to the Phoenix metropolitan area. Traffic on I-8 and SRs 85 and 238, as well as the railroad corridor, are significant contributors of emissions in the SDNM's central and southern portions. As described above, travel on unpaved roads used for recreational target shooting also results in fugitive dust emissions.

Pollutants

A review of reported air monitoring data per Arizona Revised Statutes (ARS) 49-424.10 indicates considerable progress has been made in reducing airborne pollutants throughout the state. The most drastic change has occurred in CO concentrations in the highly urbanized areas of Phoenix. Such concentrations, which regularly exceeded standards in neighborhoods and near busy intersections in Phoenix, are now well below the 8-hour CO NAAQS of 9 parts per million (ppm).

Ozone concentrations have decreased overall from 2000 to 2016 in the Maricopa nonattainment area based on eight-hour ozone trends (MAG 2016). In comparison with CO, O_3 may prove to be more difficult to curb, due to its relatively high background levels.

Trends in PM_{10} are quite variable and location dependent. Long-term trend sites in Phoenix show a slight decrease in PM_{10} concentrations for most areas, though there may be localized, unimproved areas. Pinal County reported 22 instances of exceedances of PM_{10} in 2015 (Pinal County 2016).

Particles less than 2.5 micrometers in diameter ($PM_{2.5}$) are referred to as "fine" particles and are believed to pose the greatest health risks when levels are high. $PM_{2.5}$ monitoring began in the late 1990s. While there is insufficient data to assess $PM_{2.5}$ trends confidently, the variability in concentration of these fine particles over time appears to be relatively constant, with Phoenix having the greatest magnitude.

3.2.2 Cultural and Heritage Resources

Cultural resources are past and present expressions of human culture and history in the physical environment. These can include archaeological, historic, and architectural sites, structures, or places with important public and scientific

uses. They also may include locations of traditional cultural or religious importance to specific social or cultural groups. Cultural and heritage resources in central and southern Arizona represent evidence of more than 10,000 years of human occupation. Most of the cultural resources on BLM-administered lands in the planning area are archaeological sites reflecting both Prehistoric (12,000 BC to AD 1500) and Post-contact (AD 1500 to present) periods. The BLM estimates that about 80 percent of the cultural resources on BLM-administered lands reflect aboriginal occupation and 13 percent Euro-American occupation, with a high percentage of sites of unknown age or cultural affiliation.

The cultural resources information available for the SDNM derives from project-driven surveys in response to Section 106 undertakings (54 USC, Section 306108) conducted over several decades. At present, the BLM has inventoried approximately 6 percent of the SDNM and recorded 300 sites. This is indeed a small sample compared to the overall size the SDNM. However, in areas where BLM does have information, site densities of 5 to 15 archaeological sites per square mile are common. Based on existing data, and in consideration of landforms and proximity to the Gila River, it is probable that similar site densities are present throughout the SDNM. The BLM estimates, that if completely inventoried, the SDNM may contain more than 5,000 sites.

Recorded cultural resources include archaic hunting camps, prehistoric procurement sites, lithic scatters, ceramic scatters, Hohokam occupational sites, petroglyph sites, prehistoric and historic trail corridors, historic artifact scatters, historic artifact scatters with features or structures. Evaluating the significance of cultural resources recorded on BLM-administered lands is an ongoing aspect of the BLM's cultural resource management program. The criteria for inclusion on the National Register of Historic Places (NRHP) are used for evaluating the significance of archaeological and historical sites.

Approximately 70 percent of currently evaluated cultural resources in the decision area are NRHP eligible, most often under Criterion D (36 CFR, Subpart 60.4 [d]), which is an evaluation of the potential of the site to yield information important in history or prehistory.

The BLM also allocates cultural resources to various use categories when developing a management strategy for these resources. These use categories include conservation for future use and traditional, public, scientific, and experimental uses. If cultural resources lack significant value, they may be discharged from management. Most of the currently recorded archaeological sites in the SDNM are allocated to the scientific use category.

Other forms of allocation and protection for cultural resources are designation as national monuments, NHTs, and areas of critical environmental concern (ACECs) for cultural resources.

The Monument proclamation (see **Appendix A**) states that Vekol Wash is believed to have been an important prehistoric travel and trade corridor between the Hohokam and tribes located in what is now Mexico.

The Juan Bautista de Anza NHT is one of 19 congressionally designated national scenic and historic trails in the United States and the only NHT with a segment in the SDNM. This trail is a historic corridor, with no known physical remains. Approximately 17 miles of the NHT passes through the SDNM. The visual setting of the trail through the SDNM probably has been altered less since its original use than any other segment of the entire 1,200-mile route (National Park Service [NPS] 1996).

Historic documents indicate the Anza Expedition camped at one location camp within the boundaries of the SDNM. Although no physical evidence of this or any other camps in southern Arizona has been found to date, these locations have public interpretation potential. In the 1840s, the Mormon Battalion built a wagon road along the same corridor. Subsequently, tens of thousands of emigrants traveled west along this route to California. In the late 1850s and early 1860s, the Butterfield Overland Stage improved the route.

Factors threatening the historic integrity of cultural resources include disturbance or destruction by various development projects or land uses, natural erosion, route proliferation, and unauthorized excavation and artifact collecting by vandals or uninformed recreational users.

The presence of cultural resources does not necessarily indicate that these resources would be directly impacted by target shooting. However, target shooting, vehicle use, surface disturbance, erosion, illegal dumping activities, and noise can impact cultural resources. Artifacts can be displaced and crushed, which compromises the integrity of location and materials. Walls, structures, and features can be shot directly or by ricochet. For other types of cultural resources, such as the Juan Bautista de Anza NHT or Native American religious uses, intrusions on the integrity of the setting could be an important impact concern. The recreational target shooting areas observed in SDNM are typically found in proximity to vehicle routes, so use and potential impacts on cultural resources are likely to be concentrated in these areas

Roughly 5 percent of monitored cultural resources on BLM-administered lands are being damaged by erosion. Intentional vandalism and unauthorized collection of artifacts have damaged cultural resources, but there is little quantified information about the extent of this threat. Proliferation of unauthorized travel routes within the SDNM has increased over the last 10 years to the point that some cultural resources, formerly considered to be in remote locations with difficult access, have become quite easy to access by vehicle. In many cases, routes were discovered leading to sites or cutting through site areas. These additional routes, and the overall increases in all-terrain vehicle (ATV) use, have led to higher rates of vehicle damage to some sites and increased site visitation.

The BLM has responded to these threats with several strategies. One of the most successful is providing systematic site monitoring through the statewide Site Steward Program. Physical protection measures are used when damage or threats are perceived. Barriers to limit access and signs to inform visitors about laws protecting sites are installed as needed.

The BLM also uses administrative measures, such as road closures, or special management designations to protect cultural resources. One other way to improve protection of selected sites is to develop them for public interpretation. Interpretive site development includes intensive planning and installation of protective measures and interpretive media that enhances visitor experiences.

Most previous cultural resource inventories were done for project compliance reviews under Section 106 of the NHPA, which is now referenced as 54 USC, Section 30618. In recent years, some federal funds have been allocated to document and research cultural resources on BLM-administered lands, but project compliance surveys will undoubtedly continue to be an important source of inventory information in the foreseeable future.

Historic trend data indicates that 15 to 20 sites might be protected annually over the next 10 to 15 years through additional administrative and physical measures. Installing physical measures, such as signs, fences, and gates, is a common response to specific instances of resource damage. The historic data indicate that annual monitoring of 20 to 30 sites is likely over the next 10 to 15 years.

Over the last decade, the BLM's cultural resource management program has devoted more effort to public interpretation, and this trend is likely to receive more emphasis in the future. Interest in cultural resource-based heritage tourism in the SDNM is expected to increase.

3.2.3 Priority Wildlife Species and Habitat

In Arizona, the BLM manages habitat for many different categories of priority wildlife species, including the following:

- Special status species, including those listed as threatened or endangered or those proposed for listing (candidate species) under the ESA and BLM sensitive species (BLM Manual 6840)
- Bats
- Migratory birds, including birds of conservation concern
- Raptors
- Game species
- Species for which there is a signed conservation agreement or strategy

A number of priority animal species inhabit the SDNM, and a species list can be found in **Table 3-1**. The BLM focuses most of its wildlife-management efforts on the habitats of priority species, as required by a variety of laws, regulations, policies, plans, manuals, and agreements. This is especially the case for species listed under the ESA. Because the priority species label covers many different types of wildlife species, the following discussion on habitat requirements for priority species is pertinent to most, if not all, wildlife species in the decision area. Therefore, there is no separate general wildlife discussion in this chapter.

Table 3-1
Special Status Species and Priority Species

Common Name	Scientific Name	Federal	State	Other	Occurrence
Mammals					
California leaf-nosed bat	*Macrotus californicus*	BS	S	-	X
Cave myotis	*Myotis velifer*	BS	S	-	X
Desert bighorn sheep	*Ovis canadensis mexicana*	-	G	-	X
Javelina (collared peccary)	*Pecari tajacu*	-	G	-	X
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E	S	-	U
Mountain lion	*Puma concolor*	-	G	-	X
Mule deer	*Odocoileus hemionus*	-	G	-	X
Sonoran pronghorn	*Antilocapra americana sonoriensis*	E	S	-	N
Spotted bat	*Euderma maculatum*	BS	S	-	X
Townsend's big-eared bat	*Corynorhinus townsendii*	BS	-	-	X
White-tailed deer	*Odocoileus virginianus couesii*	-	G	-	X
Birds					
Bald eagle	*Haliaetus leucocephalus*	BS	-	-	X
Burrowing owl	*Athene cunicularia*	BS	-	BCC	X
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	BS	S	BCC	X
Desert purple martin	*Progne subis hesperia*	BS	-	-	X
Gambel's quail	*Callipepla gambelii*	-	G	-	X
Gilded flicker	*Colaptes chrysoides*	BS	-	BCC	X
Golden eagle	*Aquila chrysatos*	BS	-	R	X
LeConte's thrasher	*Toxostoma lecontei*	BS	-	BCC	X
Mourning dove	*Zenaida macroura*	-	G	-	X
Western burrowing owl	*Athene cunicularia hypugaea*	BS	S	BCC	X
White-winged dove	*Zenaida asiatica*	-	G	-	X
Amphibians and Reptiles					
Lowland burrowing treefrog	*Pternohyla fodiens*	BS	S	-	X
Sonoran Desert tortoise	*Gopherus morafkai*	BS	S	-	X
Sonoran green toad	*Bufo retiformis*	BS	S	-	P

Table 3-1
Special Status Species and Priority Species

Common Name	Scientific Name	Federal	State	Other	Occurrence
Tucson shovel-nosed snake	*Sauromalus obesus*	-	S	-	U
Western narrow-mouthed toad	*Gastrophryne olivacea*	BS	S	-	X
Plants					
Acuña cactus	*Sclerocactus eretocentrus* var. *acunensis*	E	-	-	X
Murphy agave	*Agave murpheyi*	BS	-	-	X
Kofa barberry	*Berberis harrisoniana*	BS	-	-	X
Arizona Sonoran rosewood	*Vauquelinia californica* spp. *sonorensis*	BS	-	-	X
Tumamoc globeberry	*Tumamoca macdouglii*	BS	-	-	X

Source: USFWS 2016, AGFD 2016

Federal Status
E – Endangered
T - Threatened
C – Candidate
BS – BLM Sensitive

State Status
G – Game species
S – Species of Greatest Conservation Need

Other
BCC – Birds of Conservation Concern/USFWS - MBT
MTBA Focal Species
R – Raptor

Occurrence
P – Probable
N – Not Occurring
X – Occur
U – Unknown

Note: The Arizona BLM Sensitive Species List is dynamic. It is being updated to reflect guidance from the revised BLM Manual 6840, dated June 2008. In addition, changes in species taxonomy, information on species distribution, abundance, or new knowledge on security or threats can occur at any time, requiring changes to this list.

Wildlife Habitats

Vegetation resources management provides the foundation for wildlife and habitat management on BLM-administered lands. Wildlife typically occupy or avoid habitats in predictable ways based on life history requirements of individual species.

The SDNM supports a variety of natural vegetation communities and landscape features that offer a diversity of wildlife habitat types. While these habitat types correspond with the associated vegetation communities, they are also defined by a number of distinct landscape features, such as rock outcrops and hillsides, cliffs and taluses, mesquite bosques, and mines. All such features contribute to the diversity and abundance of wildlife in the SDNM. This is because they generally provide a microhabitat for wildlife uniquely adapted to, or dependent on, these features. To maintain diverse, viable, and abundant populations of wildlife, a mosaic of biologically and structurally diverse habitat types is thus necessary.

Habitat Connectivity/Fragmentation

While maintaining patches of diverse habitats is important, ensuring connectivity of these habitat patches also is important to provide plants and wildlife with the ability to move along elevation gradients and between habitat areas. As climatic conditions change, both wildlife and plants must be able to adapt to their associated changing niches by expanding and contracting their range.

While the surrounding area includes numerous isolated tracts of BLM-administered lands that are interspersed with other federal, state, tribal, and private lands, the SDNM consists mostly of a large, consolidated area with the potential to provide connectivity between important habitat patches for various wildlife species. However, the existing transportation network crossing the SDNM, such as SR 238 and I-8, and utility and energy ROWs fragment portions of it.

Wildlife Water Developments

Most wildlife species in the decision area are adapted to arid conditions and limited sources of permanent water; however, many species are dependent on artificial water sources during the summer months and drought. There are 20 wildlife water catchments on BLM-administered lands in the SDNM. These catchments are designed to provide perennial sources of water that support wildlife diversity.

Numerous livestock water developments have been modified to accommodate wildlife use. Many wildlife species use these water sources and return to them regularly. Bats also forage over water developments, as they are attracted by the abundance of flying insects. Resident bird species may nest and forage in or near water developments year-round, while migratory bird species may forage and rest in these areas during their migration.

Threatened and Endangered Wildlife Species

This section focuses on species in the SDNM that are addressed in BLM Manual Section 6840 (Special Status Species Management). Another focus is species listed under the ESA as threatened or endangered, proposed for listing (i.e., candidate species), species of special concern, and those within five years of being delisted. Federally listed species were identified through the USFWS Information for Planning and Conservation website on August 18, 2016 (USFWS 2016).

Two threatened or endangered wildlife species may occur in the decision area, the Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) and Sonoran pronghorn (*Antilocapra americana sonoriensis*) Nonessential Experimental.

Lesser Long-Nosed Bat

The endangered lesser long-nosed bat is a nectar-, pollen-, and fruit-eating bat that migrates seasonally from Mexico to southern Arizona and southwestern New Mexico (Arita 1991). The species typically arrives in Arizona in early April, inhabits mainly desert scrub habitats, and departs in mid- to late September. The bats roost in caves, abandoned mines, at the base of mountains where agave, saguaro, and organ pipe cacti are present. They fly long distances from their day roosts to forage each night. Potential foraging habitats, in the form of columnar cacti (e.g., saguaros and organ pipe cacti) or agave stands, occur in the decision area (see **Figure 3-2**, Priority Plant and Animal Species). There are no

Figure 3-2
Priority Plant and Animal Species

- Mule Deer Distribution
- Desert Bighorn Sheep Distribution
- Sonoran Desert Tortoise Category 1 Habitat
  High density populations
- Sonoran Desert Tortoise Category 2 Habitat
  Medium to high density populations
- Sonoran Desert Tortoise Category 3 Habitat
  Low to medium density populations
- Acuña Cactus Critical Habitat
- Sonoran Desert National Monument Boundary
- Roads, Primitive Roads, and Trails

Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
Mobile
Maricopa
Juan Bautista de Anza NHT
238
BLM Road 8004
Bosque
Maricopa County
Pinal County
347
Stanfield
84
Big Horn
8
Freeman
Jokol Valley Road

ARIZONA
Phoenix
Tucson
Map Location

Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_AE_SSS_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 5 10
Miles

documented lesser long-nosed bat roost sites or maternity colonies in the decision area; however, four known maternity colonies do occur near the Arizona-Mexico border on lands not administered by the BLM.

The most significant threat to the survival of the lesser long-nosed bat is habitat loss. The species must have suitable roosts near adequate food sources, both in the southwestern United States, where the young are born during the summer, and at their wintering grounds throughout the arid areas of Mexico (USFWS 1995).

Threats to food plants also indirectly threaten the lesser long-nosed bat. There is a complex, mutually beneficial relationship between columnar cacti, agaves, and long-nosed bats (Fleming et al. 1996). As native vegetation is increasingly removed for development, other projects, and through grazing, food sources become less and less available near roost sites and along migration routes.

There is no widespread consensus on the current status of the overall population of this bat species. Disagreements about the validity of census techniques have kept estimations, even to a higher order of magnitude, from being made (USFWS 1995). Because surveys in Arizona and Mexico conducted between the mid-1970s and 1985 failed to document large numbers of lesser long-nosed bats, the species was federally listed as endangered in 1988.

Since listing, the species appears to be much more abundant than previously thought, but it is still vulnerable because of its gregarious roosting behavior. As many as 150,000 adults and subadults may forage in southwestern Arizona on any given summer night. In 1992-1993, a census of 17 roosts in Arizona and Mexico produced estimates of 200 to 130,000 individuals living in any particular roost (USFWS 1995). Ten years of monitoring data (1996-2005) from one known maternity roost on private lands outside the decision area indicates a general increase in population size.

Sonoran Pronghorn Nonessential Experimental Population

The Sonoran pronghorn subspecies was first recognized as endangered in 1967 under the Endangered Species Preservation Act, a predecessor of the Endangered Species Act (ESA). The subspecies is currently listed as an endangered species throughout most of its range under the ESA. Additionally, there is a nonessential experimental population of Sonoran pronghorn in Arizona, designated as such under section 10(j) of the ESA, by a geographic area. The decision area is included in the nonessential experimental population area, established in 2011. The species currently does not occur in the decision area but could begin to use the area in the future if the species is transplanted east of Highway 85. The Draft Sonoran Pronghorn Recovery Plan (2015) identifies that portion of the decision area south of Interstate 8 as within the Sauceda Reintroduction Management Unit, but does not project when pronghorn may be moved into the decision area from a future release site on DOD lands. Primary threats to the species include barriers that limit distribution and movement;

loss, fragmentation, and degradation of habitat; human-caused disturbance; and drought.

Special Status and Priority Wildlife Species

Reptiles

The SDNM supports a variety of reptiles, including priority species, due to a diversity of vegetation communities and habitat types. Some reptiles prefer dense brushy or rocky areas, such as rosy boas (*Lichanura trivirgata*) and chuckwallas (*Sauromalus ater*), whereas others inhabit areas that are more open, such as sidewinders (*Crotalus cerastrus*) and desert iguanas *(Dipsosaurus dorsalis*). Reptile populations are subject to habitat loss, direct mortality from vehicle traffic, drought, disease, and collection. Specific trend information for reptiles is not available for the SDNM.

Sonoran Desert Tortoise. The Sonoran population of the desert tortoise (*Gopherus agassizii*) was added to the USFWS's candidate species list (75 FR 78094) in 2010. In 2011, the Sonoran desert tortoise was formally described as a distinct species (*Gopherus morafkai*), separate from the Mojave desert tortoise (Murphy et al. 2011). In June 2015, BLM entered into a conservation agreement with the USFWS and other agencies to coordinate the management and conservation of the species and its habitat. In October of 2015, the species was found not warranted for listing and removed from the list of candidates.

The Sonoran desert tortoise occurs in various habitat types, mainly rocky outcrops along the base of mountain ranges and, to a limited degree, in intervening lands, in parts of Arizona in the United States and Sonora in Mexico. In general, and compared to many other animals, tortoises have relatively low fecundity (females lay about 5 eggs on average every other year) and are slow-growing (they may take 15 years to reach sexual maturity), but are long-lived (they may live more than 50 years in the wild). Individual tortoises grow to sizes of about 15 inches in shell length. They feed on a variety of vegetation and spend the majority of their time in underground shelters coming out mainly to drink, forage, and breed.

The most significant risk factors for Sonoran desert tortoises are: 1) altered plant communities, primarily due to the invasion of nonnative grasses; 2) altered fire regimes; 3) habitat conversion of native vegetation to developed landscapes; 4) habitat fragmentation by the construction of permanent linear structures like highways and canals; 5) human-tortoise interactions such as handling, collecting, and killing individual tortoises (especially by vehicle strikes); and 6) climate change as it relates to increases in the frequency, scope, and duration of drought.

The Sonoran desert tortoise occurs in many parts of the decision area (see **Figure 3-2**, Priority Plant and Animal Species).

Tucson Shovel-Nosed Snake. The USFWS listed the Tucson shovel-nosed snake as a candidate species in March 2010 (75 FR 16050), but the agency removed it from the candidate list, as not warranted, in September 2014 (79 FR 56730). The Tucson shovel-nosed snake occurs in dry desert habitats, including sandy dunes, desert washes and valleys, and bajadas. Associated with soils that are soft, sandy loams, with sparse gravel. Based on recent genetic analysis (Wood et al. 2014), the subspecies' current range totals over 7.7 million acres in central and western Arizona including La Paz, Maricopa (including the decision area), Pima, Pinal, Yavapai, and Yuma counties. No systematic surveys have been conducted to assess the status of the subspecies throughout its range; however, collection data indicate that the subspecies is found throughout the entirety of its estimated range. The most important stressor affecting the subspecies includes potential loss of Sonoran Desert scrub habitat due to existing urban development and potential future urban development within this habitat. Additional sources of habitat loss include road construction, use, and maintenance; conversion to agricultural use; wildfires; solar energy development; and climate change and drought. However, much of its newly refined range is unlikely to be affected by these factors in the foreseeable future.

Amphibians

The decision area's general lack of open water severely limits habitat for amphibians, which require wetland sites or ponds for at least part of their life cycle. These sites are generally limited to ephemeral rainwater collection areas, such as impoundments, including the water retention dikes in the Vekol Valley, earthen livestock water developments, and depressions in rocks. These areas support priority amphibian species, such as the Sonoran green toad (*Bufo retiformis*), Great Plains narrow-mouthed toad (*Gastrophryne olivacea*), and Sonoran Desert toad (*Bufo alvarius*).

Amphibian populations are subject to various stressors, including disease, drought, environmental pollution, invasive species, and habitat loss.

Raptors

Bald and Golden Eagles. In the United States, bald and golden eagles are protected under the Bald and Golden Eagle Protection Act. Bald eagles have recently begun nesting along the Gila River approximately 20 miles from the decision area. They primarily forage along the river and are unlikely to use the decision area. While golden eagles are occasionally observed in the deserts of southwestern Arizona, they have not been documented nesting in the decision area, despite aerial nest searches of potential nest cliffs north of Interstate 8 in 2011 (McCarty and Jacobson 2011). Limited suitable nest substrate and limited prey base may affect golden eagle use of decision area.

Other Raptors. Red-tailed hawks (*Buteo jamaicensis*), Harris's hawks (*Parabuteo unicinctus*), and American kestrels (*Falco sparvarius*) are some of the raptors that

occur in the area. Many raptor species, such as prairie falcons (*F. mexicanus*), use cliff faces and rocky ledges to roost or nest.

Documented owl species are western screech owl (*Megascops kennicottii*), great-horned owl (*Bubo virgineanus*), elf owl (*Micrathene whitneyi*), and barn owl (*Tyto alba*). While suitable habitat for the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) occurs within the decision area, there are no confirmed records of this species from the area.

Identifying trends for birds is difficult because of migration timing and patterns, climatological changes and events, and human-caused impacts. Some of these changes may positively affect one species, while negatively affecting another. Specific trend information, by species, beginning in 1966 is available in the US Geological Survey's (USGS) North American Breeding Bird Survey at http://www.mbr-pwrc.usgs.gov/bbs/.

Cactus Ferruginous Pygmy-Owl. The cactus ferruginous pygmy-owl was federally listed in 1997 as endangered in Arizona as a distinct population segment (62 FR 10730). The species was delisted in 2006 (71 FR 19425), following litigation.

The cactus ferruginous pygmy-owl is a small, nonmigratory owl that preys on birds, small mammals, lizards and insects. This species nests in cavities in saguaro cactus or trees, excavated by woodpeckers. Potential habitat within the decision area consists of dense vegetation along desert washes with saguaro or trees over 6 inches in diameter present. The SDNM RMP contains management prescriptions to protect cactus ferruginous pygmy-owl habitat.

Game and Other Species of Interest

Small Game Species

In Arizona, small game species include small mammals, upland game birds, and migratory game birds. Common small game species in the SDNM include cottontail rabbits (*Sylvilagus audubonii*), Gambel's quail (*Callipepla gambelii*), mourning dove (*Zenaida macroura*), and white-winged dove (*Z. asiatica*). Populations of mourning doves in the Western Management Unit, which includes Arizona, have shown a downward trend since 1966, the year population-trend data collection began (Dolton and Rau 2006). Quail reproduction in Arizona depends on winter/spring precipitation to produce abundant forage and insects to sustain the coveys. The lack of precipitation during this critical time results in low reproduction and decreased population levels.

Furbearers and Predators

Furbearers in the planning area include raccoons (*Procyon lotor*), ringtail (*Bassariscus astutus*), and bobcats (*Lynx rufus*). Bobcats are also grouped with

other predators, such as coyotes (*Canis latrans*), gray foxes (*Urocyon cinereoargenteus*), striped skunks (*Mephitis mephitis*), and badgers (*Taxidea taxus*).

Big Game Animals

Big game animals found in the planning area are desert bighorn sheep (*Ovis canadensis mexicana*), javelina (*Pecari tajacu*), mountain lion (*Puma concolor*), and mule deer (*Odocoileus hemionous crooki*).

Bighorn Sheep. Bighorn sheep typically are found in dry, inaccessible mountainous areas, in foothills near rocky cliffs and seasonally available water sources.

Migratory Birds

All migratory birds receive protection under the Migratory Bird Treaty Act, while Executive Order (EO) 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds, signed in January 2001) requires the BLM to evaluate the impacts of federal actions on migratory birds. In addition, IM 2008-050 (Migratory Bird Treaty Act: Interim Management Guidance) provides interim guidance to enhance coordination and communication toward meeting the BLM's responsibilities under the Migratory Bird Treaty Act and EO 13186.

Such guidance establishes a consistent approach for addressing migratory bird populations and habitats when adopting, revising, or amending land use plans and when making project-level implementation decisions until a national memorandum of understanding (MOU) with the USFWS is established.

There are approximately 450 non-game bird species native to Arizona, with about 291 species documented as breeding in the state. Of the breeding species, 237 are neotropical migrants, or birds that breed in the United States or Canada and winter in the south, from Mexico to South America. While a migratory bird inventory has not been completed, 163 of Arizona's neotropical migrants are known to nest in the area regularly or irregularly (AGFD 2001). Such species depend on quality habitats, containing adequate substrate and cover for nesting purposes, as well as diverse vegetation to supply food for brood rearing. The planning area contains breeding, nesting, brood rearing, and wintering areas, as well as migration routes that are important for migratory birds.

Bats

Arizona has a diverse assemblage of bat species that occur in the Sonoran Desert, many of which are likely to use the decision area. Other than the lesser long-nosed bat, already discussed, all other bat species that are likely to use the area are insectivorous. Bat species that use the area likely include, but are not limited to: big brown bat (*Eptesicus fuscus*), cave myotis (*Myotis velifer*), California leaf-nosed bat (*Macrotus californicus*), pallid bat (*Antrozous pallidus*), western pipistrelle (*Pipistrellus hesperus*). Mines, natural caves and rock crevices provide potential roosting habitat for bats.

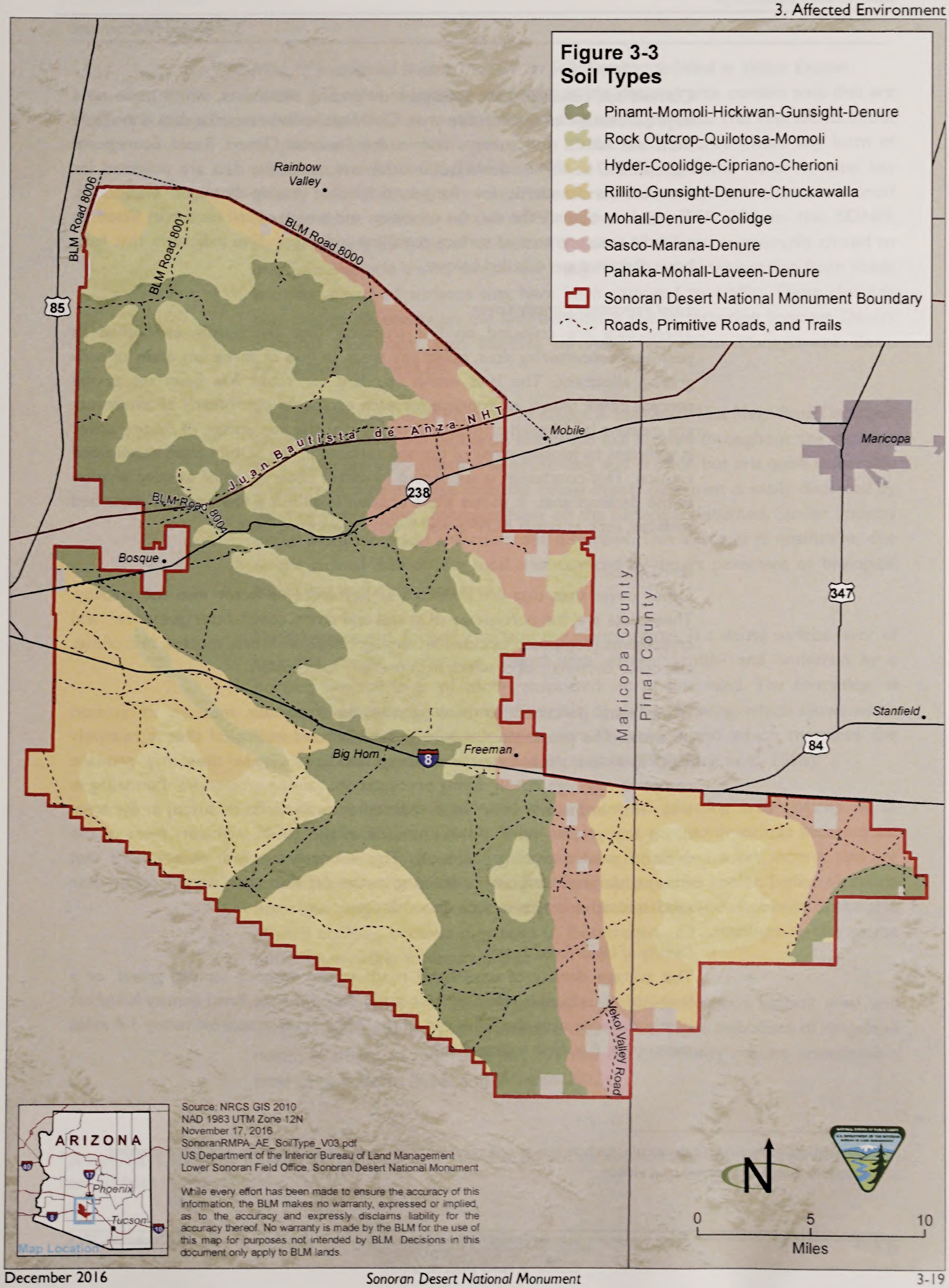
3.2.4 Soil Resources

Soils are primarily the product of climate, parent material (i.e., underlying bedrock lithology or alluvium), and landscape. The Natural Resources Conservation Service (NRCS; formerly known as the Soil Conservation Service), completed five soil surveys that, when combined, cover most of the planning area: Maricopa County, central part (SCS 1977); eastern Maricopa and Northern Pinal Counties (SCS 1974); Pinal County, western part (SCS 1991); Gila River Indian Reservation (NRCS 1991); and Gila Bend-Ajo area (NRCS 1997; see **Figure 3-3**, Soil Types). A small part of the planning area, principally the Sand Tank Mountains, falls outside these published reports.

Landforms in the planning area consist of broad, alluvial basin floors separated by basaltic or granitic mountains, hills, and rock outcrops, dissected by several major drainages and numerous ephemeral ones. In the western half, which includes most of the BLM-administered land managed in the LSFO, the dominant basin soils are deep, usually calcareous, sandy loams (Gunsight, Denure, and Rillito soils). In the eastern and southeastern portions, including areas in the Santa Cruz Basin, Casa Grande and Mohall soils are more common. Casa Grande soils developed in sediments deposited along the axis of the Santa Cruz River; Mohall soils formed on tributary alluvial fans (NRCS 1991; SCS 1991). Organic material and sodium contents are low in soils throughout the planning area.

Upland parts of the basins are carved by desert washes, with soils that are coarse- to medium-textured and cobbly to gravelly on the surface. Glocker (SCS 1991) notes several fan surfaces preserved in the area, which have some of the oldest soils in the planning area. Soils higher on broad alluvial fans often derive directly from upslope bedrock and are underlain by a caliche (hardened calcium carbonate) layer (Cipriano). Farther down on the alluvial fan, soils, such as Denure and Dateland, often occur, with loamier texture in the upper horizons and less distinct carbonate layering.

Several large desert ephemeral washes divide the planning area. Deep, stratified sands, silts, and cobbles underlie the channels and floodplains, with textures depending on flow regimes. Some cobbly reaches along the Gila and Salt Rivers are relics of the period before upstream dams diverted the rivers' perennial flows. More loamy soils exist on the higher floodplains. In the areas inundated by Painted Rock Dam, silt and clay layers of desiccation and salt accumulation are found, and, in some places, these layers are scoured by subsequent flood events. Terrace soils that parallel the main channel of these rivers on one or both sides are coarse, gravelly, and stratified, with low organic content (less than 1 percent) and recently active sediments overlaying older, valley alluvium or bedrock. Dunes are occasionally found where fine sand and consistent winds are common.


Figure 3-3
Soil Types
Pinamt-Momoli-Hickiwan-Gunsight-Denure
Rock Outcrop-Quilotosa-Momoli
Hyder-Coolidge-Cipriano-Cherioni
Rillito-Gunsight-Denure-Chuckawalla
Mohall-Denure-Coolidge
Sasco-Marana-Denure
Pahaka-Mohall-Laveen-Denure
Sonoran Desert National Monument Boundary
Roads, Primitive Roads, and Trails
Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
Juan Bautista de Anza NHT
Mobile
Maricopa
238
BLM Road 8004
Bosque
Maricopa County
Pinal County
347
Stanfield
84
Big Horn
8
Freeman
Jekol Valley Road
ARIZONA
Phoenix
Tucson
Map Location
Source: NRCS GIS 2010
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_AE_SoilType_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument
While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.
N
0
5
10
Miles

Current soil conditions are evaluated on grazing allotments, which make up a large percentage of the decision area. Quantitative soil-resource data is available from the NRCS soil surveys and in the Sonoran Desert Rapid Ecoregional Assessment. Some additional quantitative and qualitative data are collected for the Arizona Standards for Rangeland Health grazing-allotment evaluations. These data estimate the current condition and trends of soil resources based on periodic measurement of surface condition indicators. Five indicators that have been observed are detailed below.

Total Vegetation Canopy Cover

These data are collected on line transects that are usually established as permanent monitoring sites, called key areas, in two or three key areas of each grazing allotment. The land health standard for cover has been set as the percent cover that is appropriate for each ecological site. Nearly all allotments are meeting land health standards showing that the percentage of canopy cover is sufficient to protect most of the soil surfaces in the SDNM from accelerated erosion. This conclusion is supported by direct observation of existing erosion in the decision area. It shows slight erosion in all but a few severely disturbed surfaces, such as roads ROWs, and livestock watering sites.

Bare Ground

Other cover data that are collected at key areas to factor into soil stability. These data are the percentage of gravel and stone cover, litter presence[1], and cryptogams (composed of cyanobacteria, green algae, lichen, mosses, microfungi, and other bacteria), all of which help prevent soil erosion.

Other data pertained to bare ground, an important measure of erosion potential. The proportion of bare ground on arid ecological sites is relatively high, even on sites that are meeting standards. These sites may produce comparatively high runoff during precipitation, causing erosion via channeling in areas with slopes and sheet wash sedimentation (i.e., accumulation) in flat areas of no topographic relief. As in the case of the cover indicator, most of the decision area is meeting standards. This is consistent with observations that little accelerated erosion is occurring in the decision area, except on or near roads and other major surface disturbances.

Density of Unsurfaced Roads

The average density of unsurfaced roads (those without asphalt, gravel, or a long-lasting surface) is relatively low in the decision area. Road density is highest within the area near the west end of the Anza Trail, at approximately 1.4 miles per section (i.e., one square mile).

[1] Ground-covering organic materials, such as leaves and twigs, that lie upon the soil surface, not the discarded household waste left behind by a visitor

Miles of Inventoried Routes That are on Soils Sensitive to Wind or Water Erosion
About 107 miles of inventoried routes in the decision area contain soils that are classified by NRCS as sensitive to wind or water erosion. This represents about 17 percent of the inventoried routes in the decision area where any form of travel occurs (BLM GIS 2016 and NRCS GIS 2004). Some water erosion has already been observed on or near inventoried routes that have channeled runoff in the north portion of the LSFO and north of SR 238 in the SDNM. Approximately 83 miles of inventoried routes have been temporarily closed to motorized vehicle traffic, due to the risk of wind and water erosion from roads with fine-textured surfaces that have been damaged by traffic. These closures may change depending on the final decision in the forthcoming Sonoran Desert National Monument Juan Bautista de Anza Recreation Management Zone Recreation Plan Final EA.

Area of Protective Desert Pavement or Biological Soil Crusts That Have Been Disturbed
Desert pavement and biological soil crusts are located throughout the decision area. They are very effective in preventing soil erosion but are quite vulnerable if disturbed. Fine material that sifts below desert pavement is easily displaced by wind or water if the protective layer on the surface is disturbed. Similar impacts occur when biological soil crusts are disturbed. This indicator is qualitative, due to the lack of data on the total area covered by desert pavement or biological soil crusts in the decision area.

Desert pavement, found in parts of the planning area, is a dense surface layer of rounded stones, sometimes coated with desert varnish[2] and underlain by a porous, skeletal layer of wind-transported silt or fine sand. The formation of desert pavement appears to be the result of surface heaving, which allows wind-deposited, fine-grained particles to sort downward and which magnifies the density of coarser material exposed on surface (McFadden et al. 1998).

Biological soil crusts are found throughout the planning area (Belnap et al. 2001). In the Sonoran Desert, these crusts most commonly include heterocystic cyanobacteria, gelatinous lichen, squamulose lichen, and short mosses and are most often present in areas with flat topography (unlike cooler, higher-elevation basin and range deserts). These soils represent a critical component of the arid West's ecology, because they tend to fix nitrogen and contribute to the sparse nutrients available to desert plants.

Both biotic crusts and desert pavement provide protection against wind and surface-sheet erosion. Biological soil crusts appear to be indicators of rangeland health (Cameron 1960; Kade and Warren 2002) and may require considerable time to revegetate (Kade and Warren 2002).

[2] A dark, hard, sunbaked film consisting of an uneven matrix of oxides, sulfates, and clays that forms on exposed rock surfaces in arid regions.

Desert pavement and biological soil crusts have been not substantially studied or mapped in the Sonoran Desert. Disturbed areas are most often found close to livestock water developments and vehicular compaction, where the livestock generate heavily used trails, and in areas where intense cross-country off-highway vehicle (OHV) use creates new routes. Available trend data show generally static conditions for desert pavement and biological soil crusts.

Soil disturbance and compaction are present in long-term use areas, including livestock congregation sites, roads, and parking areas. Larger areas of accelerated erosion and sedimentation are mainly in the Vekol Valley south of I-8.

Historical uses, such as construction of water-spreading dikes in areas with higher erosion hazards, created these effects. While uses that could cause soil resource degradation have increased in the planning area over the last 20 years, protective and restoration practices have generally kept pace. On the other hand, ongoing drought and intensive dispersed uses, such as illegal off-road travel, continue to threaten soil resource conditions, as indicated by BLM grazing allotment records, NRCS ecological site guides, range health reference sheets, and soils surveys. If the current regional drought continues, impacts from recreation, livestock grazing, and other ground-disturbing uses could be compounded. Similarly, if urban demands for water increase on lands next to the decision area, soil loss could worsen.

Based on best available data and analysis in the allotment evaluations, accelerated soil erosion is infrequent. Water-erosion hazard is highest on the coarse-textured, steeper slope soils found in the granitic soils in the western and southwestern portions of the planning area. Wind-erosion hazards are highest on the fine-textured, irrigated soils of the major drainages. Except for data collected on allotments, very little soil condition data is collected that could be used to indicate trends.

Figure 3-4, Soil Wind Erosion Potential, shows areas of wind-erosion potential. These are typically areas of Mohall, Dateland, Denure, Indio, and Casa Grande soils. Younger soils with silty surfaces and little cover, often occurring on drainage floodplains in the planning area, are the most susceptible to wind erosion.

Figure 3-4
Soil Wind Erosion Potential

Slight
Moderate
Moderately High
High
Sonoran Desert National Monument Boundary
Roads, Primitive Roads, and Trails

Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
Juan Bautista de Anza NHT
Mobile
Maricopa
238
BLM Road 8004
Bosque
Maricopa County
Pinal County
347
Stanfield
84
Big Horn
8
Freeman
Vekol Valley Road

ARIZONA
Phoenix
Tucson
Map Location

Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_AE_SoilErosion_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 5 10
Miles

3.2.5 Vegetation Resources

The SDNM is in the Sonoran Basin and Range Major Land Resource Area (MLRA). An MLRA is a broad geographic area characterized by a particular pattern of soils, climate, water resources, vegetation, and land use. Each MLRA has subdivisions based on precipitation zones in which rangeland and forestland occur and is further divided into ecological sites. The most common ecological sites in the SDNM are identified in the plant community descriptions below.

The SDNM supports a variety of upland and xeroriparian vegetation communities. These communities are determined in large part by site-specific topography, soil type, and climate. Vegetation community classifications follow the USGS (2011) Gap Analysis Program vegetation community map system.

Vegetation Communities

Five vegetation communities are found in the SDNM decision area (see **Table 3-2**, Vegetation Communities, and **Figure 3-5**, Vegetation Communities). Boundaries between vegetation communities are not precise, because several types or developmental stages may be found in any vegetation community. However, the grouping system can be used to describe representative vegetation over large regions, such as the SDNM.

Table 3-2
Vegetation Communities

Vegetation Community	Acres
Creosote bush-bursage	176,000
Palo verde/mixed cacti	303,200
Sonoran mid-elevation desert scrub (woodlands)	1,300
Desert grassland	1,000
Desert washes (xeroriparian), linear inclusion of other vegetation communities	944 (miles)[1]
Total BLM-administered lands in planning area	486,400[2]

Source: BLM GIS 2016, Harris GIS 2005, SWReGAP GIS 2004

[1]Desert washes are measured in miles, not acres, so they are not included in area totals. Vegetation community mapping is currently not available at a high enough resolution to distinguish desert wash communities from dominant vegetation communities surrounding them.

[2]Totals do not add up because some plant communities are too small to be included in this list.

Vegetation community descriptions are provided below. Included in the descriptions are the NRCS ecological sites (NRCS 2011) most closely associated with the vegetation community in the SDNM.

Palo Verde/Mixed Cacti

This is a subgroup of the Sonoran Desert Scrub community and is the most prevalent community in the SDNM. It is found at elevations from approximately 1,500 to 4,500 feet above sea level. Vegetation in the community consists of

Figure 3-5
Vegetation Communities

- Palo Verde-Mixed Cacti
- Creosote Bush-Bursage
- Sonoran Mid-Elevation Desert Scrub (Woodlands)
- Desert Grassland
- Other
- Desert Washes (Xeroriparian)
  Linear inclusion of other vegetation communities
- Sonoran Desert National Monument Boundary
- Roads, Primitive Roads, and Trails

Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
Mobile
Maricopa
Juan Bautista de Anza NHT
238
BLM Road 8004
Bosque
Maricopa County
Pinal County
347
Stanfield
84
Big Horn
8
Freeman
Vekol Valley Road

ARIZONA
Phoenix
Tucson
Map Location

Source: SWReGAP 2004
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_AE_Veg_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 5 10
Miles

extensive stands of saguaro cacti (*Carnegiea gigantea*), interspersed with cholla (*Cylindropuntia* spp.), barrel cacti (*Ferocactus* spp.), palo verde (*Parkinsonia* spp.), brittlebush (*Encelia farinosa*), creosote bush (*Larrea tridentata*), ocotillo (*Fouquieria splendens*), mesquite (*Prosopis* spp.), cat claw acacia (*Senegalia greggii*), and desert ironwood (*Olneya tesota*; Shreve 1951; Brown 1994; Marshall 2000). In the SDNM, this vegetation community is most commonly associated with the limy upland, granitic hills, volcanic hills, and basalt hills ecological sites in the 3- to 7-inch, 7- to 10-inch, and 10- to 13-inch precipitation zones.

Creosote Bush-Bursage

This is considered a subgroup of the Sonoran Desert Scrub vegetation community and is the second most prevalent community in the SDNM. Occurring at elevations from 400 to 3,000 feet above sea level, it is the most arid of the vegetation communities, consisting primarily of creosote bush and white bursage (*Ambrosia dumosa*) or triangle leaf bursage (*A. deltoidea*; Shreve 1951; Brown 1994). In the SDNM, this community is most associated with the limy fan, limy upland deep, and sandy loam deep ecological sites in the 3- to 7-inch, 7- to 10-inch, and 10- to 13-inch precipitation zones.

Sonoran Mid-Elevation Desert Scrub (Woodlands)

This community is found mainly near mountain peaks surrounded by the palo verde/mixed cacti community. It receives higher precipitation and has a higher diversity of native plants than that of the surrounding communities. The vegetation typically is composed of an open shrub layer of creosote bush, narrow leaf goldenbush (*Ericameria linearifolia*), or flattop buckwheat (*Eriogonum fasciculatum*), with taller shrubs, such as crucifixion thorn (*Canotia holacantha*) or jojoba (*Simmondsia chinensis*). The herbaceous layer generally is sparse.

Relic communities of juniper (*Juniperus* spp.), yucca (*Yucca* spp.), and elephant tree (*Bursera microphylla*) have also been observed in the Sonoran Mid-Elevation Desert Scrub community (BLM 1989; PBI 2003). Due to its more remote location, this vegetation type has generally escaped human-related impacts. In the SDNM, this community is associated with the volcanic and basalt hills ecological sites in the 7- to 10-inch and 10- to 13-inch precipitation zones.

Desert Washes (Xeroriparian)

This community occurs as small inclusions in large areas of upland sites. Washes are dynamic in nature and typically flow only briefly in direct response to significant precipitation. The vegetation of desert washes is quite variable, ranging from sparse and patchy to moderately dense, and usually occurs along the banks but may occur along the braids within the channel. The woody layer typically is intermittent to open and may be dominated by shrubs and small trees. Common species are mesquite, catclaw acacia, blue palo verde (*Parkinsonia florida*), and desert ironwood. While such plant species also are found in upland habitats, species growing in ephemeral washes commonly are larger and occur at higher densities than in adjacent uplands. In the SDNM, this

plant community is associated with the sandy wash ecological site in the 3- to 7-inch, 7- to 10-inch, and 10- to 13-inch precipitation zones.

Desert Grassland

This community is characterized as a warm, temperate grassland, dominated by tobosa grass (*Pleuraphis mutica*) and ranging in elevation from 2,300 to 4,900 feet. The only area supporting this community occurs in the southeast portion of the SDNM, abutting the Tohono O'odham Indian Reservation. This plant community likely supported occasional wildfire historically, although it is quite arid. In the SDNM, it is associated with the clayey swale ecological site in the 7- to 10-inch precipitation zone.

Special Status Plant Species

There are four special status plant species in the SDNM: one federally listed endangered and three BLM sensitive. See **Table 3-3**, below.

Table 3-3
Special Status Plant Species

Common Name	Scientific Name	Status
Acuña cactus	*Echinomastus erectocentrus* var. *acunensis*	Federal endangered
Kofa barberry	*Berberis harrisoniana*	BLM sensitive
Arizona Sonoran rosewood	*Vauquelinia californica* spp. *sonorensis*	BLM sensitive
Tumamoc globeberry	*Tumamoca macdougalii*	BLM sensitive

Acuña Cactus

The acuña cactus (*Echinomastus erectocentrus* var. *acunensis*, also known as acuña pineapple or red pineapple cactus) was listed as endangered under the ESA on October 31, 2013 (78 FR 60607). One of these populations is in the SDNM. The cactus occurs on well-drained knolls and gravel ridges between major washes in Sonoran Desert Scrub habitat at elevations ranging from 1,300 to 2,000 feet.

In August of 2016, critical habitat for the acuña cactus was designated on 18,535 acres in six units in portions of Maricopa, Pima, and Pinal counties. In the decision area, 1,355 acres in the Sand Tank Mountains were designated as critical habitat for the acuña cactus (81 FR 55265).

Over the last three decades, increased insect attack in combination with water and heat stress have resulted in more than 80 percent mortality with little or no recruitment documented within monitored populations. Most living acuña cactus individuals are also threatened by border activities.

The amount and quality of habitat for this species are currently not possible to assess, due to limited information on its distribution. Populations have been documented to range from 40 to more than 300. Because this species grows in small, widely scattered populations and only a small part of its potential range

has been surveyed, it is probable that additional populations have not been detected.

The SDNM population is remote and relatively inaccessible; therefore, it is at less risk from human disturbance.

Kofa Barberry

The Kofa barberry (*Berberis harrisoniana*), also known as Harrison's barberry, is a rounded, evergreen shrub that can grow to over six feet tall. This species occurs at one location in the Sand Tank Mountains in the SDNM. Threats are believed to be drought and poaching. However, the population is remote and relatively inaccessible, so it is less at risk from poaching. It appears to be stable, although drought is a common occurrence in the Sonoran Desert. Population numbers are believed to be between 20 and 50 plants.

The species has 1.6 to 3.5-inch long compound leaves, with three leaflets that taper to a short, stout spine. The plant flowers from mid-February to March and fruits in late March to April. The flowers are bright yellow and the fruits are blue-black berries. The Kofa barberry grows in the bottom of deep, shady, rocky canyons, with soils derived from andesite or rhyolite, at 2,200 to 3,500 feet in elevation.

Arizona Sonoran Rosewood

The Arizona Sonoran rosewood (*Vauquelinia californica* spp. *sonorensis*) is a large shrub or small tree, with a dense, dark green canopy that typically grows from 10 to 16 feet tall. The plant can be identified by its leathery leaves that are green on top and white-hairy on bottom. The leaves are approximately 0.25 inches to nearly 0.5 inches wide and up to 4 inches long, with serrated margins and pronounced spines. Flowers are white, approximately 0.25 inches to 0.5 inches wide, and clustered in 2- to 3-inch flat-topped heads.

The Arizona Sonoran rosewood occurs at two locations in the Sand Tank Mountains in the SDNM. Threats to the species are believed to be drought and poaching. The populations are remote and relatively inaccessible, so they are at less risk from poaching. They appear to be stable, although drought is a common occurrence in the Sonoran Desert. Population numbers are not well recorded for this species, however there are an estimated total of 20 to 60 plants at the SDNM populations.

Tumamoc Globeberry

Tumamoc globeberry (*Tumamoca macdougalii*) is a fruit-producing, perennial vine in the gourd family. In Arizona, the species' habitat exists from southern Pinal and Maricopa Counties into Pima County, where it is widespread. It grows from a tuberous root and features a smooth, slender stem and grasping tendrils. The stems sprout annually and die back after fruiting. The plant's lacy leaves have three main lobes, each with narrow, linear secondary lobes from 0.5 to 1.5 inches long. When the foliage is touched, it gives off a fetid smell.

Globeberry flowers are pale yellow to greenish yellow, with male and female reproductive organs borne on separate flowers. Male flowers outnumber female flowers and form in stalks of two to six flowers. Female flowers have shorter lobes and are borne singly along the stems, at leaf attachment points. Fruits are succulent and berry-like, resembling tiny, round watermelons. They are pale green with darker stripes becoming yellow, then turning red when ripe. Seeds consist of two to several per fruit, and are 0.25-inches long.

Threats to the species are believed to be livestock grazing and drought. Livestock grazing was removed from the known area of occurrence in the SDNM in the early 2000s, so authorized livestock grazing is no longer a threat; drought is a common occurrence in the Sonoran Desert. Tumamoc globeberry occurs in the Vekol Valley in the SDNM and appears to be stable. Population numbers are not well recorded for this species, but there are an estimated 20 to 100 plants in the SDNM population.

Monument Vegetation Objects

Several vegetation-related objects are identified in the 2001 proclamation establishing the SDNM. These are vegetation assemblages and individual plant species. Objects are identified and described in detail below.

Saguaro Cactus Forest

The proclamation describes "large saguaro cactus forest communities," dense assemblages of saguaro cacti. These are associated with "a wide variety of trees, shrubs, and herbaceous plants" that comprise a forest community in the SDNM. Dense saguaro cactus communities are widespread throughout the SDNM, occurring on a variety of landforms, such as mountains, hills, surrounding piedmonts, and bajadas[3] (Felger et al. 2001).

The saguaro cactus is a drought-adapted, cold-intolerant, warm-desert species that occurs throughout most of the Sonoran Desert (Steenbergh and Lowe 1977). Saguaro cactus forests (Steenbergh and Lowe 1977) occur primarily on coarse, gravelly or rocky soils of south-facing slopes and adjoining bajadas, areas that stay relatively warm in the winter. Saguaro cacti are generally sparse or absent on north-facing slopes and fine-textured valley floor soils. These are relatively cold winter environments, due to slope aspect and thermal inversions that result from cold-air drainage and accumulation in valley bottoms (Steenbergh and Lowe 1983).

Saguaro cactus forests, as identified by the proclamation, are not comprised solely of saguaro cacti, but instead include a diverse variety of trees and shrubs. Saguaros rely on associated plant species for establishment and survival. Nurse plants facilitate saguaro establishment and survival by regulating microclimates occupied by young cacti. Nurse plants provide winter thermal cover, summer

[3] A broad, gently sloping alluvial plain extending from the base of the mountains to the valley floor

shade, and moderate moisture availability (Steenbergh and Lowe 1969, 1977; Brum 1973; Drezner and Garrity 2003; Zou et al. 2009). Vegetation assemblages in the SDNM saguaro cactus forest Palo-Verde-Mixed Cacti community described in **Section 3.2.8.1**, Vegetation Communities. Common nurse plants are palo verde, brittlebush, creosote bush, mesquite, cat claw acacia, and desert ironwood.

Saguaro also benefit from thermal cover provided by rocky environments. During winter cold spells, cacti growing near rocks can be protected from lethally cold temperatures by heat radiating from rocks during the night (Steenbergh and Lowe 1977). Rocks can also provide summer shade, moderating temperature and moisture availability in a similar manner as nurse plants.

In the SDNM, saguaro cactus forest communities are most commonly associated with the limy upland, granitic hills, volcanic hills, and basalt hills ecological sites in the 3-to 7-inch, 7- to 10-inch, and 10- to 13-inch precipitation zones.

Unique Woodland Assemblages

The proclamation identifies unique woodland assemblages on the higher peaks in the SDNM. These areas, including the Sand Tank, Javelina, Table Top, and Maricopa Mountains, receive higher precipitation than lowlands in the SDNM. They are associated with the volcanic and basalt hills ecological sites in the 7- to 10-inch and 10- to 13-inch precipitation zones. In these highlands, foothill palo verde (*P. microphylla*) and ironwood increase to relatively dense stands of over 10 percent cover and reach heights of up to 20 feet (Felger et al. 2001). A more diverse shrub understory is composed of creosote bush, narrow leaf goldenbush, flat top buckwheat, and jojoba.

Relic communities of juniper (*Juniperus* spp.), yucca (*Yucca* spp.), and elephant tree (*Bursera microphylla*) have also been observed in the Sonoran Mid-Elevation Desert Scrub community (BLM 1989; PBI 2003). Arizona rosewood and Kofa barberry also occur in the unique woodland assemblages.

Due to the more remote location of this vegetation type, it has generally escaped human-related impacts.

Sand Tank Mountains Plant Assemblages

The proclamation identifies the "rich diversity, density, and distribution of plants" in the Sand Tank Mountains area of the SDNM. These are a long and complex series of mountains and hills in the southern portion of the SDNM, abutting the Barry M. Goldwater Range to the south. Due to the more remote location, the area has generally escaped human-related impacts.

The palo verde/mixed cacti vegetation in the Sand Tank Mountains contains high densities of palo verde and ironwood trees, cacti, including dense saguaro

stands, and grasses, including summer annual grasses, like six-weeks grama (*Bouteloua barbata*), and perennial grass species such as curly mesquite grass (*Hilaria belangeri*), bush muhly (*Muhlenbergia porteri*), and tobosa grass (Felger et al. 2001).

The Sand Tank Mountains' higher elevations contain a plant assemblage that is rare in the region. Unusual species include redberry juniper (*Juniperus coahuilensis*) and BLM sensitive species Arizona rosewood and Kofa barberry (*B. harrisoniana*). Kofa barberry is found only in the Kofa, Ajo, and Sand Tank Mountains (Marshall et al. 2000). The population of crucifixion thorn in the Sand Tank Mountains is disjunct from the main body of the species' range in the Mogollon Rim country of central Arizona (Felger et al. 2001).

Other Vegetation Objects

The proclamation also identifies the palo verde/mixed cacti association, creosote-bursage plant community, desert grassland, and washes as vegetation objects (see **Section 3.2.8.1**, Vegetation Communities). The proclamation also identifies the endangered acuña pineapple cactus (see **Section 3.2.8.2**, Special Status Plant Species).

3.2.6 Water Resources

Within the Sonoran Desert, winter rainfall originates from the Pacific Ocean and decreases from west to east, depositing the greater proportion of rainfall in the northwest portion. During the summer monsoon, a shift of wind brings rain from the south beginning in July through September, mostly as localized storm cells. Summer rainfall occurs in the opposite pattern, decreasing east to west, with most falling in the southeast portion. Episodic summer storm events send pulses of flood water overland and down ephemeral and intermittent stream channels (Strittholt et al. 2012).

As displayed in **Table 3-4**, below, there are eight watersheds (i.e., 10-digit hydrologic unit code) that overlap portions of the decision area.

Table 3-4
Watersheds

Watershed Name	Size in Decision Area (Acres)
Lower Santa Rosa Wash	19,900
Lower Vekol Wash	11,900
Middle Santa Rosa Wash	1,200
Quilotosa Wash	2,700
Rainbow Wash-Gila River	126,300
Sand Tank Wash	112,400
Upper Vekol Wash	105,000
Waterman Wash	107,000
Grand Total	*486,400*

Source: NHD GIS 2016

In arid and semi-arid regions, streams experience extreme variations in water flow, permanence, and sediment transport that produce braided, meandering, or anastomosing channels in flat areas, but remain straight in areas with notable slope. Stream flows range from perennial (mountain source or spring-fed) to spatially intermittent (flowing only where local hydrogeologic conditions raise the water table above the streambed), temporally intermittent (where the water table seasonally supports streamflow), and ephemeral (flowing in response to storms or derived from storm-related bank-storage events; Strittholt et al. 2012).

Desert washes are key resources in the planning area; however, most flow has been impounded for various purposes. Small water-control devices, including spreader dikes, berms, dirt tanks, and remnant impoundments from mining activities, are scattered across the planning area to capture rainfall and ephemeral flows in desert washes for use by livestock and wildlife (BLM 2012). Wildlife water developments are described in **Section 3.2.3**, Priority Wildlife Species and Habitat, and water developments associated with range improvements are described in **Section 3.3.1**, Livestock Grazing.

The SDNM has a general lack of open water. Wetland sites or ponds are generally limited to ephemeral rainwater collection areas such as impoundments, including the water retention spreader dikes in the Vekol Valley; earthen livestock water developments; and depressions in rocks (BLM 2012).

Within the decision area, there are no perennial streams, 23 miles of intermittent streams, and 4,565 miles of ephemeral streams (NHD GIS 2016). None of these streams are on the Clean Water Act Section 303(d) list (EPA GIS 2015), which identifies waters that do not meet water quality standards and where a total maximum daily load pollutant load limit needs to be developed.

Groundwater resources are not discussed in detail because recreational target shooting would not change groundwater quality, quantity, or distribution.

3.2.7 Lands with Wilderness Characteristics

Background

The BLM inventoried wilderness characteristics between 2003 and 2010. In addition, interested citizens submitted proposals to the BLM, particularly the Arizona Wilderness Coalition. As part of the land use planning process and in response to input received during scoping for the 2012 RMP revision, the BLM assessed the planning area for wilderness characteristics.

Field Assessments

The BLM developed the assessment of lands with wilderness characteristics from the following sources:

- A review of Wilderness Review, Arizona—Intensive Inventory of Public Lands Administered by the BLM, Decision Report (BLM 1980) and Wilderness Review, Arizona: Initial Inventory of Public Lands Administered by BLM, Decision Report (BLM 1979). These documents are comprehensive evaluations of wilderness characteristics on BLM-administered lands in Arizona that were conducted during 1978-1980, as directed by Section 603 of FLPMA.
- Public input received during scoping that delineated tracts of BLM-administered lands reported to possess wilderness characteristics
- Fieldwork conducted by the BLM in 2003 and 2005 to ascertain the continuing validity of the findings of the 1980 inventory and to appraise input received from the public during scoping
- Citizen groups' wilderness characteristics proposals submitted between 2003 and 2005—The citizens' proposals were based on the application of the BLM's 1978 Blue Book wilderness inventory handbook process. The Blue Book process required route forms, roadway definitions, size requirements, definitions of "outstanding," and files, narratives, and documentation for all areas proposed. Some citizen proposals were highly detailed reports, based on the Blue Book process; other citizen proposals were maps of areas that the groups considered to possess wilderness characteristics.

Comparison of the 1978-1980 wilderness characteristics review with fieldwork conducted during 2003-2005 identified five findings or trends relevant to the SDNM, as follows:

- Overall, the decision area maintained a high degree of naturalness. There were no large-scale or incompatible land uses with long-lasting or irreversible impacts on naturalness occurring since 1980.
- More acres in the decision area exhibited potential wilderness characteristics in 2005 compared to the original inventory in 1978-1980, mainly due to either additional lands (acres) not considered in the 1980 wilderness review or changing land uses, coupled with natural reclamation. Changing land uses often reflected less mineral exploration and assessment.
- The 2003-2005 fieldwork indicated that three former wilderness study areas (WSAs) found to have wilderness characteristics in 1980 (but not included as part of the congressionally designated wilderness areas) continue to exhibit such character. This has transpired since their release from FLPMA Section 603 protection in the Arizona Desert Wilderness Act of 1990. The Butterfield Stage Memorial WSA was released in its entirety in 1990.
- The 1978-1980 wilderness review did not include an evaluation of withdrawn lands administered by the US Air Force. These lands

were conveyed to the BLM with the passage of the National Defense Authorization Act for Fiscal Year 2000. They primarily consist of the Sand Tank Mountain area (Area A Special Management Area as shown on **Figure 1-1**) of the SDNM. BLM-administered lands next to the military lands, previously inventoried for wilderness characteristics in 1978-1980, were re-evaluated for wilderness characteristics in context with these contiguous conveyed lands. While much of the Sand Tank Mountains and adjoining areas were not inventoried in 1980, the area was found to have wilderness characteristics. The entire planning area was inventoried, and these areas make up most of the 154,600 acres in the SDNM decision area assessed for wilderness characteristics (BLM 2012).

- Finally, the BLM's field assessments and its comprehensive inventory of vehicle routes found a rise in motorized public visitation and the popularity of many areas for driving four-wheel drive and ATVs. Many washes, and most upland routes, were being used for motorcycle and ATV travel. These motorized uses were not common in this area in 1980, because ATV use and technologies were not yet developed or readily available to recreationists at that time. As such, implementing travel management may have considerable influence on lands managed to protect wilderness characteristics.

Table 3-5, below, summarizes the five units managed to protect wilderness characteristics. These units were identified from citizen proposals and additional units identified by the BLM that were found to have wilderness characteristics after conducting field inventories and reviews of the 1978-1980 wilderness inventory findings (where applicable) for the subject unit. The BLM has developed a range of management actions, or allocations, for these units, which are outlined in the alternatives discussion of the 2012 Sonoran Desert National Monument Record of Decision and Approved Resource Management Plan.

Table 3-5
Lands Managed to Protect Wilderness Characteristics

Unit Name	Acres Managed to Protect Wilderness Characteristics
Javelina Mountains North	36,800
Javelina Mountains South	13,100
Sand Tanks East	19,600
Sand Tanks West	25,600
White Hills	13,000
Total	**108,100**

Source: BLM GIS 2016

3.2.8 Wildfire Management

Wildfires within the planning area are generally small (less than 1 acre in size) as vegetation is too sparse to carry wildfires effectively or to generate fires with sufficient heat to be self-propagating (See Updated Fire History – Table 3-10). There have been two moderate-sized fires in the SDNM since it was established in 2001, and one extremely large fire on the adjacent Barry M. Goldwater Air Force Range. The Sonoran Desert is mostly barren and wildfire fuel types consist of grass, brush, annuals, and perennials which are dependent on winter and early spring moisture or fuels that carry over from the previous year's growing season. Above-average moisture usually increases the abundance of annual fuels and fine fuel continuity. The fuels/vegetation on BLM-administered lands within the planning area is comprised mainly of shrublands-desert scrub (92 percent coverage), riparian (6 percent coverage), and grasslands (1 percent coverage), with all other categories each representing less than 1 percent coverage (BLM 2013).

The shrublands-desert scrub is characterized by grass-shrub fuel model GS2 and shrub model SH1. The riparian vegetation group is characterized by grass-shrub fuel model GS2, and the grasslands vegetation group characterized as GR2 (BLM 2013).

Subject to exceptionally wet winter and spring conditions, the potential for larger fires may increase due to the establishment and spread of nonnative grass species, such as red brome. This is because these species increase the continuity of fine fuels. Based on the shrublands-desert scrub, fuel model GS2, the potential wildfire behavior spread rate would be high with moderate flame lengths should continuity of fine fuels spread wildfires (Scott and Burgan 2005).

Fire Ecology

In Natural Desert Scrub communities, the distance between shrubs is too great for fire to spread, unless annual plant growth in the interplant spaces is sufficient to carry fire along between shrubs. As a result, such communities experience long fire return intervals, with frequencies extending hundreds of years (McAuliffe 1995; Rogers and Steele 1981).

Wildfires in the SDNM, whether of human or natural causes, are relatively rare and typically do not exceed one or two acres before burning out naturally (see **Table 3-8**, Wildland Fires 2009-2016, under *Wildfire History*). Above-average winter precipitation, such as the winter of 2005, can generate sufficiently dense grasses and other annual plants to carry wildfire over a more widespread area than normal. In years with typical precipitation levels, this effect most likely occurs in the upland and mountainous regions of the decision area, where high annual plant densities and steep slopes may combine to create conditions to carry fire. The upslope impacts of wind and convection are often factors in propagating fires in these circumstances.

Within Sonoran Desert Scrub habitats, the establishment and spread of nonnative grass species, such as red brome (*Bromus rubens*), has increased wildfire frequency and spread potential. As mentioned above, interplant spaces in this community have historically had low fuel levels that would not carry fire. Because introduced, nonnative annual grasses are prolific seed producers and grow rapidly, especially during wet years, they occupy interplant spaces and enable fire to carry throughout the community that is not adapted to fire. With an increased fire frequency, native grasses and shrubs cannot compete, resulting in a loss of native plant communities.

In addition, fires burn hotter and farther, reducing the natural mosaic pattern typical of desert scrub communities (i.e., patchy distribution of plants and open space; Esque et al. 2003). Such fires are considered wildfires of special concern. This is because they can burn uncharacteristically in terms of intensity, severity, and extent. Moreover, they could have long-term, adverse impacts on ecosystem components and processes, such as biodiversity, soil productivity, and hydrologic processes.

There is little evidence of extensive wildfires in southwestern floodplain ecosystems before Euro-American settlement. Lightning- and human-induced fires now occur across a variety of low elevation, riparian ecosystems where nonnative plant species, such as salt cedar (*Tamarix* spp.), has invaded (Busch 1995, cited in Ellis et al. 1998). Colonization and naturalization of nonnative plant species affect native ecosystems by altering historical fire regimes. The deciduous nature of salt cedar and the periodic flooding suppression needed in river floodplain ecosystems to decrease forest floor litter have increased fuels accumulation. This makes the riparian communities highly susceptibility to wildfires (Ohmart and Anderson 1982, cited in Ellis et al. 1998). In addition, these conditions put floodplain ecosystems at high risk of unnatural, high-intensity wildfires (Esque et al. 2003).

In some cases, wildfire frequency in riparian ecosystems has increased, with fire return intervals being as short as 5 to 15 years. This can create monotypic stands of salt cedar in the ecosystems. Salt cedar sprouts prolifically after a fire, but native riparian vegetation, including cottonwood, is not well adapted to severe fire (Ohmart and Anderson 1982; Busch 1995, cited in Ellis et al. 1998). The increasing frequency of wildfires in riparian ecosystems can further change the vegetation composition and structure and may have detrimental effects on riparian-obligate species.

Fire and Fuels Management

All land in the decision area is assigned to one of the following categories for fire management (Esque et al. 2003):

- Allocation I (Wildfires managed for multiple objectives) are areas where only natural caused fires (e.g., from lightning) are suitable for to achieve multiple resource-management objectives

- Allocation 2 (Suppression, not managed for multiple objectives) management applies to all human-caused fires and areas not suitable to achieve multiple resource-management objectives. Generally, these areas exhibit conditions where fire is not a part of the natural fire regime.

The SDNM is in an Allocation 2 area, which does not allow management of wildfires to achieve multiple objectives (BLM 2013).

Fire Management Units

Fire Management Units (FMUs) are specific land management areas defined by fire management objectives, management constraints, topographic features, access, values to protect, political boundaries, and fuel types. The SDNM is located within FMU-5, as identified in the 2013 Phoenix District Fire Management Plan.

Fire Regimes and Condition Classes

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human intervention but including the possible influence of aboriginal fire use (Agee 1993; Brown 1995; Brown and Smith 2000). Coarse-scale definitions for natural fire regimes were initially developed by Hardy and others (2001) and Schmidt and others (2002) and subsequently re-interpreted by Hann and Bunnell (2001). The five natural fire regime groups are classified based on the average number of years between fires (fire frequency or mean fire interval [MFI]) combined with characteristic fire severity reflecting percent replacement of dominant overstory vegetation (Interagency FRCC Guidebook version 3.0, September 2010). **Table 3-6**, below, identifies applicable fire regimes for the SDNM planning area.

Table 3-6
Historical Fire Regimes, Based on Fire Frequency and Severity

Fire Regime Group	Fire Frequency and Severity	Vegetation Communities	Acres of Vegetation in the Decision Area
I	0-35 years; low severity (surface fire most common)	None in the planning area	0
II	0-35 years; high severity (stand replacement)	desert grassland and Apacherian-Chihuahuan Mesquite Upland	1,054
III	35-100+ years; mixed severity	None in the planning area	0
IV	35-100+ years; high severity (stand replacement)	Sonoran Mid-Elevation Desert Scrub and Mogollon Chaparral	2,100
V	> 200 years; high severity (stand replacement)	creosote bush-bursage, palo verde/mixed cacti, Sonoran-Mohave Mixed Salt Desert Scrub, and Riparian	482,900

Sources: Hann et al. 2004; National Interagency Fuels, Fire, and Vegetation Technology Transfer 2008

Fire regime condition classes reflect the current degree of departure of existing vegetation from modeled reference conditions. FRCC assessments measure departure in two main components of ecosystems: 1) fire regime (fire frequency and severity) and 2) associated vegetation (Interagency FRCC Guidebook version 3.0, September 2010). **Table 3-6** displays the historical, natural fire regimes, based on fire frequency and severity, for the lands in the planning area. These fire regime groups are generalized and address only the primary types of fires that occur in the planning area (see **Figure 3-6**, Fire Regime Groups).

A vegetation community's current condition is a function of the degree of departure from historical fire regimes altering key ecosystem components, such as species composition, structural stage, stand age, and canopy closure. This departure may have resulted from such past management activities as fire exclusion or suppression, vegetation resources, grazing, introduction and establishment of exotic plant species, and insects or disease (introduced or native; Hann and Bunnell 2001). To identify departures from historical conditions, the decision area has been organized into condition classes (CCs) as indicators of fire management needs (see **Table 3-7**, below). CC1 describes lands that are in or near historical ranges, CC2 describes lands where fire regimes have changed moderately from historical ranges, and CC3 are fire regimes significantly altered from historical ranges (see **Figure 3-7**, Fire Regime Condition Class.)

Landscape-level fire and fuels management strategies, including wildfire suppression, vegetation and fuel treatments, and prescribed fires, are used in the planning area to reduce the fire hazard and risk in the wildland and WUI areas. In general, actions related to fire and fuels management should reduce the amount of lands characterized as Fire Regime CC2 and CC3. Fuels hazard reduction may include prescribed fire, mechanical, biological, and chemical treatments, or a combination thereof. The fuels treatment strategies reduce both existing fuels levels and risks of large, damaging wildfires.

Landscape-level fire and fuels management strategies are designed to limit wildfire extent, to modify fire behavior, to protect values at risk, and to improve terrestrial ecosystem conditions. Fire management and fuels treatment strategies allow land and resource managers to control fires and set priorities that protect firefighters, public life and property, and natural resources.

Table 3-7
Current Fire Regime Condition Classes by Vegetative Community

Vegetation Community by Condition Class	Acres of Vegetation Community in the Decision Area
Creosote bush-bursage – CC1	174,000
Creosote bush-bursage – CC2	2,200
Creosote bush-bursage – CC3	0
Palo verde/mixed cacti – CC1	288,800
Palo verde/mixed cacti – CC2	14,400
Palo verde/mixed cacti – CC3	0
Apacherian-Chihuahuan mesquite upland – CC1	330
Apacherian-Chihuahuan mesquite upland – CC2	24
Apacherian-Chihuahuan mesquite upland – CC3	0
Sonoran mid-elevation desert scrub – CC1	1,100
Sonoran mid-elevation desert scrub – CC2	190
Sonoran mid-elevation desert scrub – CC3	0
Sonoran-Mohave mixed salt desert scrub – CC1	2,400
Sonoran-Mohave mixed salt desert scrub – CC2	9
Sonoran-Mohave mixed salt desert scrub – CC3	0
Mogollon chaparral – CC1	29
Mogollon chaparral – CC2	68
Mogollon chaparral – CC3	0
Desert grassland –CC1	0
Desert grassland –CC2	1,100
Desert grassland –CC3	0
Riparian[1] – CC1	520
Riparian[1] – CC2	220
Riparian[1] – CC3	0

Sources: Hann et al. 2008; National Interagency Fuels, Fire, and Vegetation Technology Transfer 2008
[1]Riparian vegetation class combines the following plant communities: Invasive Southwestern Riparian Woodland and Shrubland, North American Warm Desert Riparian Mesquite Bosque, and North American Warm Desert Riparian Woodland and Shrubland. This total includes only the vegetated land classes in the planning area; it does not include some minor vegetation communities that are too small to be on this list.

Figure 3-6
Fire Regime Groups

Fire Regime Group III
35-100+ years; mixed severity

Fire Regime Group IV
35-100+ years; high severity (stand replacement)

Fire Regime Group V
> 200 years; high severity (stand replacement)

Sonoran Desert National Monument Boundary

Roads, Primitive Roads, and Trails

Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
Juan Bautista de Anza NHT
Mobile
Maricopa
238
BLM Road 8004
Bosque
347
Maricopa County
Pinal County
Stanfield
84
Big Horn
8
Freeman
Jekyl Valley Road

ARIZONA
Phoenix
Tucson
Map Location

Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_AE_FireRegimeGroups_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 5 10
Miles

Figure 3-7
Fire Regime Condition Class

Fire Regime Condition Class I
Lands where fire regimes are in or near historical changes

Fire Regime Condition Class II
Lands where fire regimes have changed moderately from historical ranges

Sonoran Desert National Monument Boundary

Roads, Primitive Roads, and Trails

Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
Mobile
Juan Bautista de Anza NHT
BLM Road 8004
238
Bosque
Maricopa
Maricopa County
Pinal County
347
Stanfield
84
Big Horn
8
Freeman
Yekol Valley Road

ARIZONA
Phoenix
Tucson
Map Location

Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_AE_FireRegimeConditionClass_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 5 10
Miles

Wildfire History

Wildfire history is closely related to vegetation and climate patterns in terrestrial ecosystems. Patterns of fire frequency, season, size, severity, and uniformity are functions of existing vegetation conditions, weather, elevation, physiographic features, ignition sources, and fire suppression activities.

Between 1989 and 2009, approximately 70 percent of the fires in the planning area occurred in the PHD Desert South of I-10 FMU; approximately 98 percent of all fires in the planning area were human caused. Most of these fires typically occurred along main travel corridors and rivers. An increasing portion of the fires in the planning area is associated with undocumented alien or drug trafficking operations.

Fire numbers vary from year to year and generally occur between March and September. The 20-year average is four fires a year that burn approximately 4,610 acres in total. Multiple fire days, consisting of two or more fires per day, have occurred twice in the past 20 years. There were no historically significant fires in the planning area until the 2005 fire season. This was the result of above-average fall and winter rains causing an abundance of annual grass that fueled over 20 fires, totaling over 80,000 acres. The largest single fire that has occurred in the decision area was the Tracks Fire, which burned in the Maricopa Mountains of the SDNM during summer 1994 and grew to over 5,000 acres.

Updated fire history for the years of 2009-2016 show 30 fires in the SDNM, 25 of which were human caused (See **Table 3-8**, Wildland Fires 2009-2016). Although the exact cause of some of the human-caused fires has not been identified, no fires have been attributed to recreational target shooting.

Table 3-8
Wildland Fires 2009-2016

Year	Fire Name	Size	Cause
2009	Sonoran	0.1	Human
2009	Free	0.1	Human
2009	Freeman	0.3	Human
2009	Bighorn	0.3	Human
2009	Lost Horse	0.1	Human
2010	Sandtank Well	0.1	Lightning
2010	White Tank	0.3	Lightning
2010	157	0.1	Human
2010	Vija	0.1	Human
2010	Platt	0.1	Human
2010	Sandtank	0.1	Human
2010	18	0.1	Human
2010	Bender Wash	0.1	Human
2010	Bender	0.1	Human
2010	137	0.1	Human

Table 3-8
Wildland Fires 2009-2016

Year	Fire Name	Size	Cause
2012	Lost Horse	0.3	Lightning
2012	Little Horn	0.1	Human
2012	Getz Well	0.1	Human
2013	Garret	0.3	Lightning
2013	Bighorn	0.1	Human
2013	Shaw	0.1	Human
2014	Top	0.1	Lightning
2015	Dual	0.1	Human
2015	137	0.1	Human
2015	Hidden Valley	0.1	Human
2016	Drain	0.3	Human
2016	Sonoran	0.3	Human
2016	Vekol Valley	0.3	Human
2016	West	0.1	Human
2016	Maricopa Valley	0.1	Human

3.3 Resource Uses

3.3.1 Livestock Grazing

Livestock grazing in the SDNM is managed under Title 43 of the CFR, Part 4100, and is based on the Taylor Grazing Act (43 USC, Section 315, Subsections 315a-315r), FLPMA (43 USC, Section 1701 et seq.), the Public Rangeland Improvement Act (43 USC, Section 1901 et seq.), and Presidential Proclamation 7397. Grazing permits are issued according to CFR, Subpart 4130.2(d), and generally last 10 years.

The BLM may change allotment schedules, stocking rates, classes of livestock, or other grazing practices if a resource concern arises. When permits are scheduled for renewal, the BLM evaluates resource conditions in the allotments, consistent with the 1997 Arizona Standards for Rangeland Health and Guidelines for Grazing Administration (now also referred to as Land Health Standards and Arizona Guidelines for Grazing Administration). Grazing practices are managed to achieve resource and grazing objectives, as described in the terms and conditions of the grazing permit.

Rangeland Health and Conditions

The overall objective of the SDNM's rangeland management program is to manage soil and vegetation communities to meet land health standards and multiple-use objectives. The BLM's job is to maintain the health of the land or make appropriate changes on the ground where land health standards are not being met. The standards help the BLM, public land users, and others to focus on a common understanding of acceptable resource conditions. The standards communicate current and desired resource conditions among the various groups. Guidelines describe or communicate techniques for managing activities

to achieve those desired conditions. Guidelines for grazing management emphasize multiple use by incorporating needs for wildlife habitats, soil, watersheds, riparian areas, and recreation.

The specific program goals and objectives are accomplished through activity-level planning. Attention is given to proper season of use; suitable grazing systems; plant and animal requirements; kind, class, and distribution of livestock; placement of rangeland improvements; and other rangeland uses. Together with livestock operators, other affected agencies, and interested publics, the BLM examines the indicators addressed by the standards. It assesses whether they are being achieved, and, if not, whether livestock grazing is the cause. If resource monitoring shows standards are met or progress is being made toward meeting them, then existing management can continue. If progress is not being made toward achieving standards, then management recommendations are developed.

Current Livestock Use

The SDNM has 10 associated grazing allotments, four of which are primarily located south of I-8, where livestock grazing ended once permits in effect at the time of the 2001 proclamation expired. The other six allotments north of I-8 have lands both in and outside of the SDNM. **Figure 3-8**, Livestock Grazing Allotments, displays the location of each of these allotments.

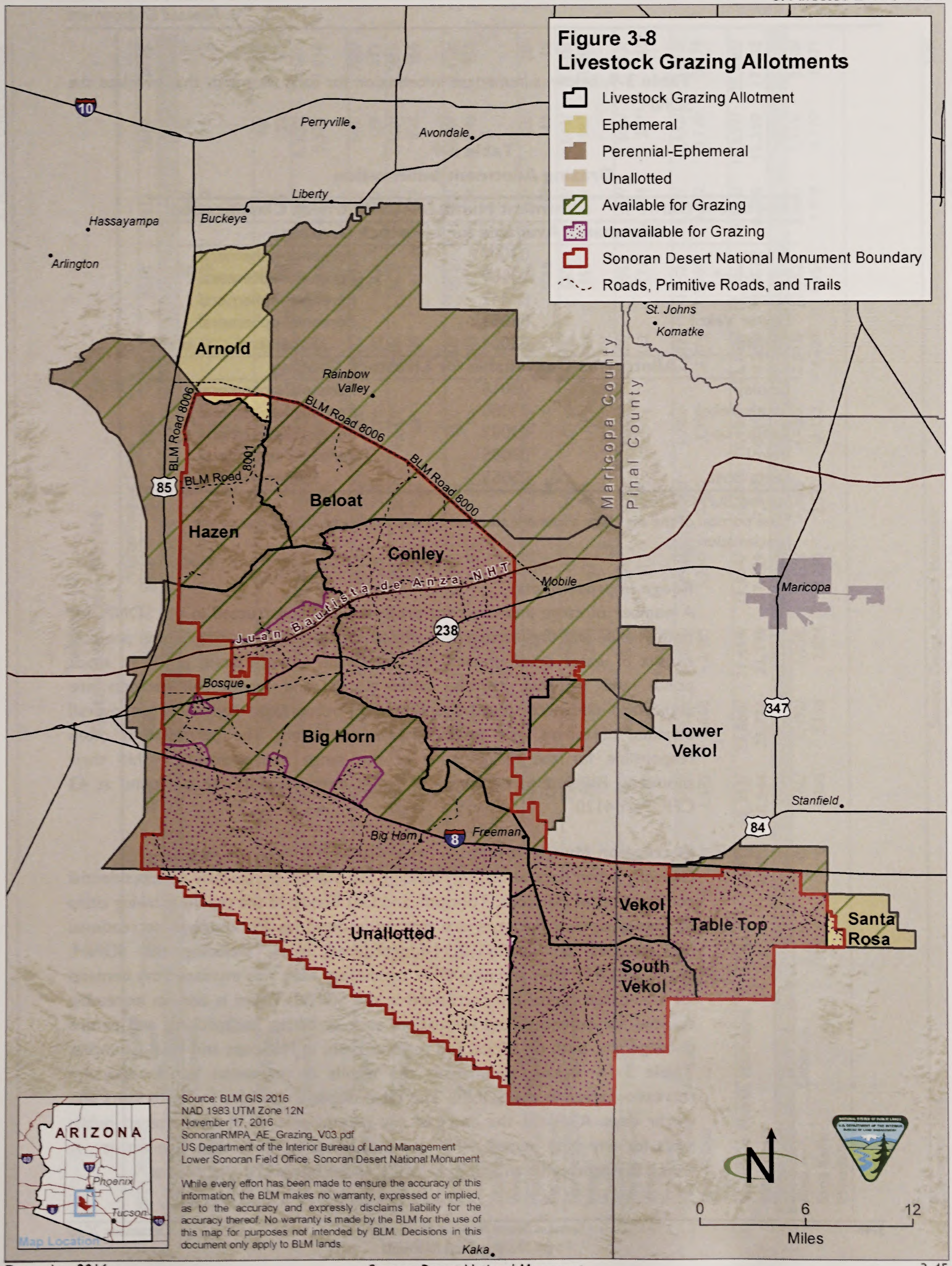
The SDNM has two allotments where livestock grazing is unavailable because they are located entirely south of I-8. Two allotments are authorized for ephemeral grazing[4] only, and six allotments are authorized for perennial-ephemeral grazing.[5] Ephemeral allotments and perennial-ephemeral allotments may be authorized for ephemeral use following sufficient winter rains. For these types of authorizations, the duration and number of livestock authorized to graze an ephemeral crop is assessed on a case-by-case basis.

Livestock operations of the SDNM allotments classified as perennial-ephemeral are generally yearlong cow-calf operations and involve raising calves for market from a base cattle herd. These operations usually encompass a mixed ownership of private, Arizona State Trust, and BLM-administered lands within allotment boundaries. Although the operations are yearlong, they may use the federal rangelands only seasonally.

[4] Ephemeral means the allotment produces only enough forage to support a livestock operation during the winter and spring wet periods.

[5] Perennial-ephemeral means the allotment consistently produces enough forage to support a livestock operation year-round but has the potential for additional use during wet periods.

Figure 3-8
Livestock Grazing Allotments



Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_AE_Grazing_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

Table 3-9, below, summarizes information for each allotment that overlaps the SDNM.

Table 3-9
Grazing Allotment Information

Allotment Name	Allotment Number	Allotment Classification
Allotments Available for Livestock Grazing		
Beloat	03007	Perennial-ephemeral
Big Horn*	03009	Perennial-ephemeral
Hazen	03042	Perennial-ephemeral
Lower Vekol	03053	Perennial-ephemeral
Arnold	03004	Ephemeral
Allotments Unavailable for Livestock Grazing		
Conley	03018	Perennial-ephemeral
South Vekol	03080	Perennial-ephemeral
Table Top	03083	Perennial-ephemeral
Vekol	03085	Perennial-ephemeral
Santa Rosa	05055	Ephemeral

Source: BLM GIS 2016
*The portion of the Big Horn allotment south of I-8 was made unavailable due to the proclamation

Range Improvements

A number of range improvement projects were constructed in the SDNM for both wildlife and the management of domestic livestock grazing. These projects consist of water developments (e.g., windmills, storage tanks, pipelines, stock ponds, and troughs), corrals, cattle guards, and fences. All projects are authorized under cooperative agreements or permits, depending on overall benefits, objectives, and private investment levels. The permittee is often responsible for the maintenance of the range improvements within their allotment. Regulations pertaining to range improvements can be found at 43 CFR, Part 4120.

3.3.2 Recreation Management

Growing urban populations surrounding the SDNM, particularly new residential communities of Maricopa, Tonopah, and Gila Bend and the rapidly growing cities of Goodyear and Buckeye, are increasing demands for outdoor recreational opportunities on nearby BLM-administered lands, including the SDNM. Increased OHV sales and new OHV technology have also increased the demand for trail-based motorized recreation in the SDNM. There is also an increasing demand for nonmotorized recreation, such as hiking, backpacking, and nature photography, both on a local and regional basis, in Maricopa and Pinal Counties. **Table 3-10**, below, summarizes the trends in recreation use for popular recreation areas in the SDNM. The table displays numbers for both visits and visitor days. A visit is the entry of any person onto BLM-administered public lands for any time period, who may participate in more than one activity. A visitor day represents an aggregate of 12 visitor hours at a site or area.

Table 3-10
Visitor Use in the SDNM

Site Name	Primary Use	Visits/Visitor Days												
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
North Maricopa Mountains														
Barry Goldwater Area Dispersed	Dispersed	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Brittlebush Trailhead	Trailhead	96/ 82	210/ 185	222/ 166	32/ 79	114/ 48	137/ 65	20/ 10	31/ 15	54/ 26	69/ 33	36/ 17	46/ 22	48/ 23
Dispersed-North Maricopa	Dispersed	10,621/ 6,287	7,966/ 4,713	8,165/ 9,118	6,545/ 7,529	6,750/ 6,441	6,984/ 6,664	3,360/ 3,206	3,422/ 3,265	6,771/ 3,752	7,209/ 4,656	7,080/ 4,573	8,320/ 5,373	17,060/ 11,018
Mount Gap Well	Historic	2,944/ 3,284	0/ 0	671/ 1,353	1,122/ 1,977	1,721/ 4,962	1,971/ 5,589	100/ 288	356/ 178	741/ 370	807/ 404	474/ 237	448/ 157	780/ 273
Historic Corridor Trailhead-East	Historic	2,944/ 3,284	2,379/ 2,676	2,930/ 2,246	8,020/ 6,089	5,388/ 2,739	5,989/ 4,791	1,300/ 927	1,547/ 645	638/ 229	867/ 311	402/ 144	1,460/ 523	1,580/ 566
Historic Corridor Trailhead-West	Historic	3,343/ 2,612	2,736/ 2,109	4,194/ 3,066	6,660/ 5,155	5,484/ 3,884	5,697/ 4,368	60/ 20	253/ 84	560/ 383	953/ 651	1,148/ 724	2,190/ 840	2,438/ 955
Margies Cove East Trailhead	Trailhead	88/ 50	82/ 43	494/ 197	5/ 54	59/ 30	125/ 71	60/ 34	150/ 85	21/ 12	26/ 15	32/ 18	23/ 13	28/ 16
Margie's Cove West Campground	Campground	324/ 316	274/ 259	431/ 233	160/ 156	544/ 530	645/ 629	980/ 956	1,079/ 1,052	493/ 481	565/ 551	709/ 691	1,012/ 987	1,118/ 1,090
Margie's Cove West Trailhead	Trailhead	0/ 0	0/ 0	595/ 580	487/ 673	315/ 179	374/ 212	680/ 238	1,508/ 691	607/ 212	488/ 171	547/ 644	506/ 287	613/ 215
North Tank (Butterfield Trail)	Historic	0/ 0	0/ 0	553/ 1,585	830/ 2,062	1,079/ 2,985	1,942/ 5,240	1,100/ 2,090	1,788/ 3,397	2,282/ 4,374	1,962/ 3,760	1,582/ 3,032	1,632/ 3,128	1,815/ 3,479
Total for North Maricopa Mountains		**17,416/ 12,631**	**13,647/ 9,985**	**18,255/ 18,544**	**23,860/ 23,774**	**21,454/ 21,798**	**23,864/ 27,629**	**7,660/ 7,769**	**10,134/ 9,412**	**12,167/ 9,839**	**12,946/ 10,552**	**12,010/ 10,080**	**15,637/ 11,330**	**25,480/ 17,635**
Sand Tank Mountains														
Area A – Sand Tank Mountains	Other	0/ 0	0/ 0	1,566/ 1,305	1,492/ 3,158	1,358/ 2,874	1,613/ 3,220	1,368/ 2,578	1,480/ 3,133	2,043/ 4,324	2,352/ 4,954	2,862/ 5,978	2,915/ 6,170	3,010/ 6,371

Table 3-10
Visitor Use in the SDNM

Site Name	Primary Use	Visits/Visitor Days												
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Dispersed – Sand Tank Mountains	Dispersed	1,056/ 942	792/ 706	1,237/ 1,103	2,140/ 2,336	2,104/ 2,297	2,190/ 2,391	880/ 961	1,021/ 4,248	2,443/ 2,769	2,339/ 2,690	2,192/ 2,521	2,342/ 2,693	2,415/ 2,777
Total for Sand Tank Mountains		**1,056/ 942**	**792/ 706**	**2,803/ 2,408**	**3,632/ 5,494**	**3,462/ 5,171**	**3,803/ 5,611**	**2,248/ 3,539**	**2,501/ 4,248**	**4,486/ 7,093**	**4,691/ 7,644**	**5,054/ 8,499**	**5,257/ 8,863**	**5,425/ 9,148**
South Maricopa Mountains														
Dispersed South Maricopa Mountains	Dispersed	183/ 183	137/ 137	240/ 240	1,080/ 1,134	1,077/ 1,177	1,165/ 1,694	1,560/ 2,119	1,842/ 2,502	1,656/ 1,960	1,743/ 1,859	1,793/ 1,913	1,880/ 2,005	1,975/ 2,107
South Maricopa Mountains Wilderness	Other	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	857/ 543	970/ 614	820/ 519	790/ 500	885/ 561
Total for South Maricopa Mountains		**183/ 183**	**137/ 137**	**240/ 240**	**1,080/ 1,134**	**1,077/ 1,177**	**1,165/ 1,694**	**1,560/ 2,119**	**1,842/ 2,502**	**2,513/ 2,503**	**2,713/ 2,473**	**2,613/ 2,432**	**2,670/ 2,505**	**2,860/ 2,668**
Table Top Mountain														
Dispersed – Table Top Mountain	Dispersed	1,281/ 2,754	1,537/ 3,305	7,113/ 15,293	6,724/ 10,784	3,364/ 5,424	3,402/ 5,486	1,280/ 2,064	1,126/ 1,816	5,080/ 8,200	4,881/ 7,952	4,730/ 7,706	4,830/ 7,869	4,950/ 8,064
Lava Flow North Trailhead	Trailhead	237/ 119	120/ 58	272/ 136	205/ 103	204/ 91	229/ 102	12/ 6	26/ 13	62/ 31	48/ 24	317/ 146	60/ 30	70/ 35
Lava Flow South Trailhead	Trailhead	226/ 44	245/ 109	420/ 182	301/ 124	204/ 91	229/ 102	62/ 56	102/ 92	80/ 72	43/ 39	313/ 177	105/ 95	110/ 99
Lava Flow West Trailhead	Trailhead	246/ 72	122/ 29	275/ 66	214/ 61	204/ 91	229/ 102	22/ 30	28/ 38	31/ 42	56/ 79	294/ 188	55/ 74	60/ 81
Table Top Campground	Campground	0/ 0	0/ 0	0/ 0	787/ 1,698	730/ 1,612	766/ 1,692	780/ 1,723	815/ 1,800	881/ 1,946	765/ 1,689	648/ 1,431	675/ 1,491	735/ 1,623
Table Top Trailhead	Trailhead	1,093/ 1,094	1,557/ 2,171	680/ 366	49/ 547	629/ 320	662/ 337	680/ 400	713/ 419	769/ 452	692/ 407	581/ 341	605/ 355	620/ 364
Total for Table Top Mountain		**3,083/ 4,083**	**3,581/ 5,672**	**8,760/ 16,043**	**8,280/ 13,317**	**5,335/ 7,629**	**5,517/ 7,821**	**2,836/ 4,279**	**2,810/ 4,178**	**6,903/ 10,743**	**6,485/ 10,187**	**6,883/ 9,989**	**6,330/ 9,914**	**6,545/ 10,266**
SDNM Total		**21,738/ 17,839**	**18,157/ 16,500**	**30,058/ 37,235**	**36,852/ 43,719**	**31,328/ 35,775**	**34,349/ 42,755**	**14,304/ 17,706**	**17,287/ 20,340**	**26,069/ 30,178**	**26,835/ 30,856**	**26,560/ 31,000**	**29,894/ 32,612**	**40,310/ 39,717**

Source: BLM 2016b

Visitor Satisfaction Surveys

The goal of the BLM recreation and visitor services program is to provide visitors with satisfying recreational experiences that are compatible with the natural setting. In 2016, 90 percent of surveyed visitors to SDNM were satisfied with the BLM's overall visitor information, facilities, management, interpretation and education, staff services, and programs. In general, the survey indicated that visitors were most satisfied with BLM's staff knowledge of the resources (97 percent satisfaction), availability of information about recreation opportunities in the SDNM (90 percent satisfaction), and that noise from recreation was kept to appropriate levels (90 percent). Visitors had a lower satisfaction level regarding conditions of motorized trails, with 61 percent being satisfied (BLM 2016a).

Recreation Management Areas

In a management approach known as outcomes-focused management, the BLM integrates perceptions of visitor demand with a setting evaluation technique referred to as an 'opportunity spectrum.' This technique allows the BLM to match (and market) locations and sites to the desired outcomes a visitor may be seeking.

When land use planning for recreation, the BLM allocates different management objectives for general areas by labeling them as extensive recreation management areas (ERMAs), special recreation management areas (SRMAs), or leaving some areas as neither.

In ERMAs, recreation management is of a custodial nature to support and sustain the principal recreation activities and natural conditions present in the ERMA.

SRMAs are areas where there are unique recreation setting characteristics and opportunities in which the BLM defines desired settings that will achieve recreation-driven goals and objectives in order to match targeted visitor outcomes. In order to manage for the desired setting and outcomes, management for SRMAs typically provides specific actions for the recreation and visitor services program, as well as influencing decisions for other programs, such as minerals, lands and realty, and travel management.

The BLM manages all 486,400 acres of the SDNM as an ERMA. Within the ERMA, the BLM manages the Desert Back Country and Juan Bautista de Anza NHT Recreation Management Zones (RMZs).

Desert Back Country RMZ

The Desert Back Country RMZ accounts for 433,600 acres (89 percent) of the decision area and provides visitors with opportunities for undeveloped, backcountry experiences primarily based on resource-dependent activities, such as hunting, dispersed camping, hiking, sightseeing, and to a lesser extent, OHV touring. There are no developed recreation facilities in the RMZ, and management objectives are to maintain undeveloped, backcountry recreation opportunities

throughout the RMZ. The RMZ includes the North Maricopa Mountains, South Maricopa Mountains, and Table Top Wilderness Areas. Visitors' expectations for the Desert Back Country RMZ include opportunities for solitude and undeveloped, largely nonmotorized recreation. Recreational target shooting occurs within the RMZ, but is isolated and occurs mostly adjacent to roadways.

Juan Bautista de Anza NHT RMZ

The Juan Bautista de Anza NHT RMZ offers visitors more developed recreation, compared to the Desert Back Country RMZ. These activities include camping in developed sites, OHV use, hiking, and scenic and cultural heritage educational opportunities related to the Anza, Butterfield, and Mormon Battalion NHT corridor. There are also trailheads in the RMZ, next to North Maricopa Mountains Wilderness (see **Figure 3-9**, Extensive Recreation Management Area and BLM Recreation Sites). Recreational target shooting occurs in the RMZ, particularly adjacent to roadways.

In 2015, the BLM prepared an EA for the Juan Bautista de Anza RMZ Plan to realize the objectives of this RMZ (BLM 2016e). The plan proposes the design and development of new parking, access road, camping, sightseeing and interpretive facilities, and a sign at the entrance of the SDNM.

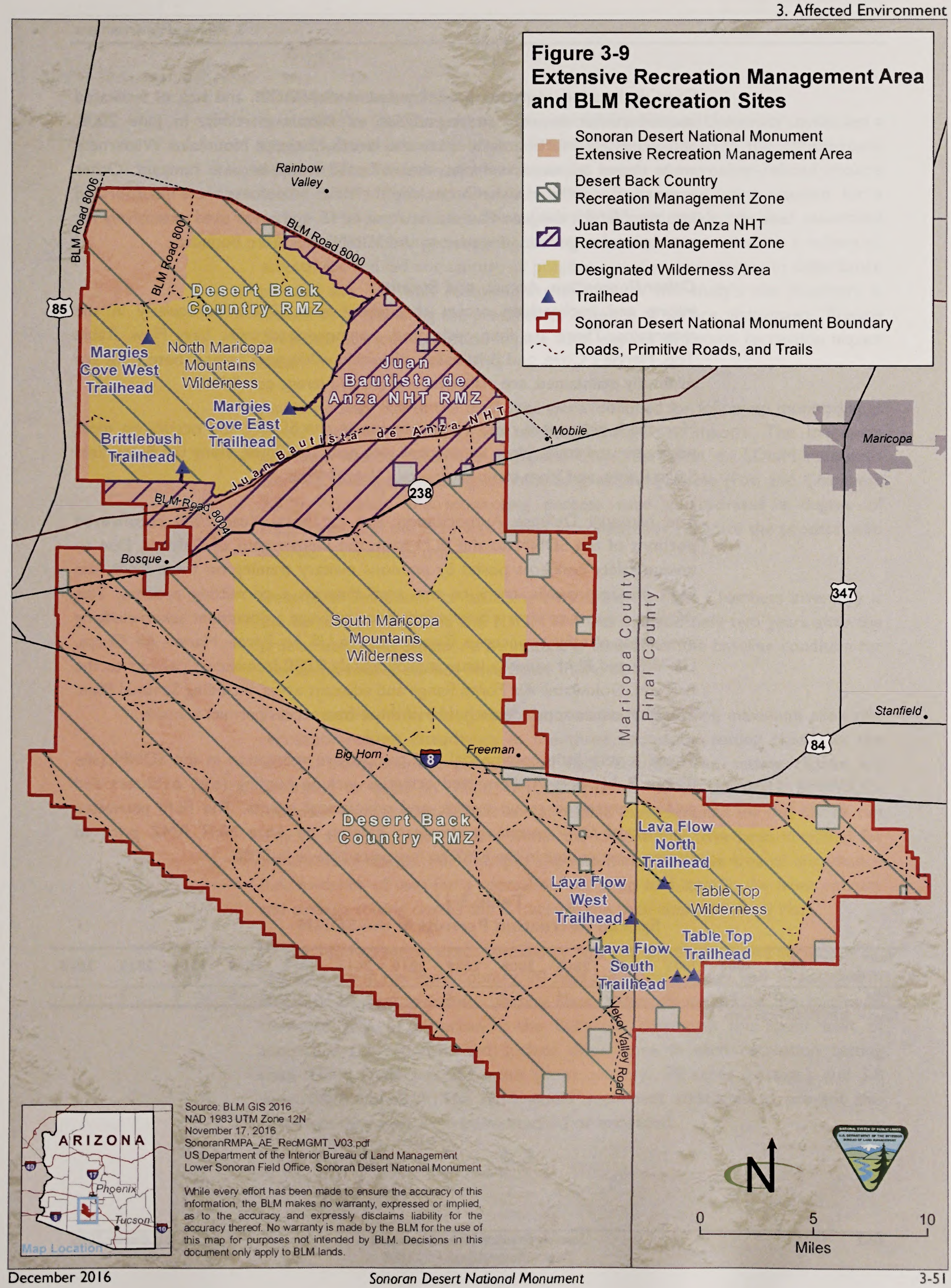
The proposed 18- to 24-site campground would be developed next to an existing vault toilet at Gap Well and would include a new 1-mile, gravel, one-way loop road to access the sites. A new visitor contact station on BLM Route 8004, north of Maricopa Road, would include a new parking area, access road, shade ramada, interpretive information, and a nonmotorized nature trail. The EA also considers two new day use areas, the addition of a parking area, an equestrian facility, and other improvements at the Brittlebush Trailhead and stream crossing improvements along BLM Route 8004.

Generally, recreation settings in the SDNM are remote, and access is by unmaintained, primitive roads that require high-clearance, often four-wheel-drive, vehicles. Facilities are small and primitive, recreation use is dispersed over the landscape, and BLM staff rarely make contact with visitors.

Recreational Activities

The principal recreation activities in the SDNM are OHV use, recreational target shooting, and nonmotorized activities, such as hiking. With the increasing regional population and OHV use in the SDNM, the BLM is observing the proliferation of new user-created two-track features, particularly north of SR 238 in the SDNM. With the exception of a specific prohibition against off-road travel, Presidential Proclamation 7397 did not refer to the provision and management of recreation and visitor services in the SDNM. Nevertheless, since an intrinsic result of such a designation is to encourage visitation, curious visitors are expected to be interested in seeing, learning about, and experiencing the natural objects for which the SDNM was designated.

Figure 3-9
Extensive Recreation Management Area and BLM Recreation Sites



Since designation, visitation has increased in the SDNM, and lack of facilitated recreation has resulted in degradation of certain portions. In June 2008, approximately 54,817 acres next to the North Maricopa Mountains Wilderness were closed to motor vehicles after off-road travel became rampant. Other areas of concentrated visitation include the three wilderness areas incorporated into the SDNM, the Juan Bautista de Anza NHT, and areas used extensively for recreational target shooting next to the SDNM's northern boundary.

Other Recreation, Access, and Permits

Hiking and backpacking occurs throughout the SDNM, particularly in the mountains. There are four designated, nonmotorized trails: Lava Flow, Table Top, Margie's Cove, and Brittlebush, all within wilderness areas. These trails are minimally maintained, are primitive, and are in average condition.

Horseback riding is a relatively minor use in the SDNM and occurs on most nonmotorized trails. Most equestrians ride near Gap Well, along the Butterfield Stage Route, and from camp areas along Vekol Wash.

The National Defense Authorization Act for Fiscal Year 2000 reconveyed portions of the SDNM to the BLM from the Department of Defense. Due to unique safety concerns posed by previous military training on these lands, the BLM manages public entry to the area through a permitting process. This requires visitors to view a brief safety video and sign a document acknowledging awareness of safety concerns. Combined, the US Air Force, Marine Air Corps, USFWS, and BLM annually issue approximately 9,000 free-access permits to the Barry M. Goldwater Air Force Range and adjacent areas, including Sentinel Plain. The BLM issues approximately 150 of these free-access permits annually.

There is very little commercial and competitive recreation in the SDNM (see **Table 3-11**, below). Permitted activities include hunting (e.g., outfitters and guides), organized group events, and educational events. The BLM permitted commercial OHV events in the Juan Bautista de Anza NHT RMZ prior to closing most routes in the RMZ to motorized travel in 2008.

Table 3-11
Special Recreation Permits in the SDNM

Year (FY End)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
SRPs	3	2	3	2	4	3	2	3	1	1	0	0	2	1

Source: BLM 2016b RMIS Data

SDNM Recreation Site Inventory

From 2003 to 2005, researchers from Northern Arizona University conducted a comprehensive inventory of all recreation sites visible from the vehicle-route network. Their intent was to evaluate the extent of recreation-related impacts in the SDNM (Foti and Chambers 2005). Site impacts were assessed for a variety of impact variables. The authors attempted to identify sites associated with recreational target shooting, but this determination relied on a subjective assessment and did not capture all possible activities contributing to disturbance at each site. For that reason, the usefulness of the study's site inventory is limited to determining the presence or absence of surface disturbance. **Figure 3-10**, Inventoried Recreation Impact Sites, depicts all known recreation impact sites.

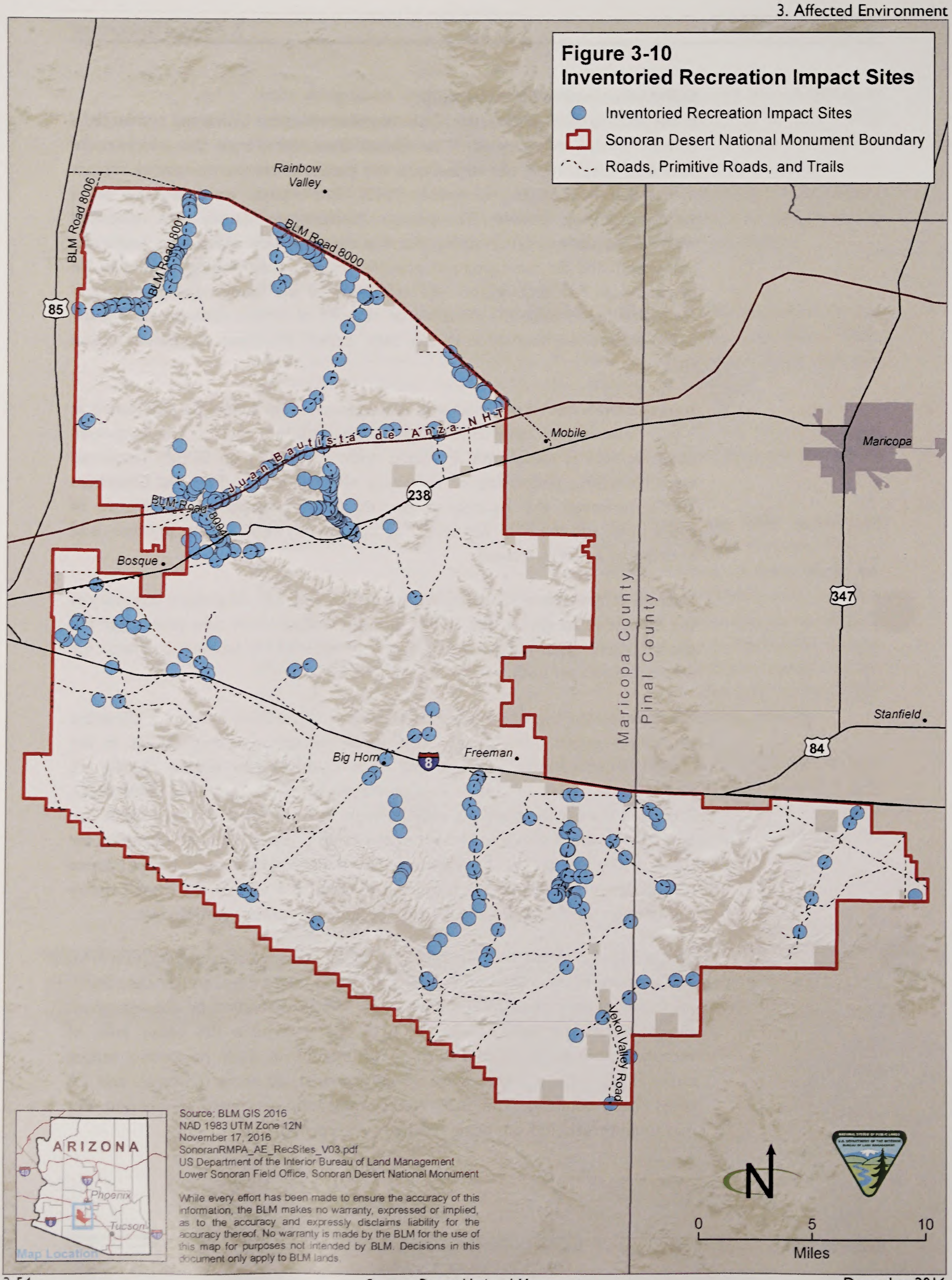
Approximately half of the total sites were identified for follow-up monitoring at 3-year intervals to determine temporal changes in impacts. The long-term objective was to determine if impacts from recreation on SDNM resources were increasing, decreasing, or remaining relatively stable (Foti and Chambers 2005); however, the monitoring process used incorporated a degree of subjectivity, and the BLM was unable to consistently replicate the process used in order to establish trends.

Despite its limitations for assessing trends, the Foti and Chambers inventory is the earliest of its kind in the SDNM and was initiated only two years after the proclamation was signed. As a result, it is considered the baseline condition for recreation-related surface disturbance in the SDNM.

The inventoried recreation sites also assist in establishing maximum allowable recreation-related disturbance in the three recreation setting classes in the SDNM: front country, passage, and back country. The setting classes are described in detail in Table C-1 of Appendix C of the 2012 RMP/ROD. Proposed management actions and allowable uses identified for this ERMA can only be allowed if they remain within the criteria that have been identified for these setting classes. For example, the maximum allowable area of disturbance (i.e., evidence of use) for a recreation site is up to 1 acre in the front country and passage setting classes and 0.1 acre in the back country setting class.

Of the 360 recreation sites identified by Foti and Chambers in the decision area, 252 sites are in the front country, 70 sites are in the passage, and 38 sites are in the back country recreation setting class. When multiplied by the maximum allowable area of disturbance, the BLM can determine the upper limit of acceptable recreation-related surface disturbance in each recreation setting class. These limits are: 252 acres (front country), 70 acres (passage), and 3.8 acres (back country). The BLM would implement strategies to prevent this maximum threshold from being reached or exceeded.

Figure 3-10
Inventoried Recreation Impact Sites



3.3.3 Recreational Target Shooting

Recreational target shooting includes the discharge of any firearm for any lawful, recreational purpose other than the lawful taking of a game animal. Recreational target shooting does not include firearms use employed in accordance with state hunting regulations, and policy regarding recreational target shooting does not apply to hunters in pursuit of game with firearms that are being employed in accordance with such regulations.

Recreational target shooting is dispersed throughout the SDNM; however, the activity is concentrated at locations next to its northern boundary along the El Paso Natural Gas Company pipeline road and smaller sites next to SR 238 and Vekol Valley Road.

Although the BLM does not have data illustrating demand placed on the SDNM for recreational target shooting, commonly observed evidence of recreational target shooting-related litter implies recreational target shooting has increased during the past 5 years. The BLM does not manage improved or facilitated recreational target shooting sites in the SDNM. Most sites are informal gathering places next to vehicle routes. These areas commonly exhibit recreational target shooting damage to dominant vegetation, such as saguaro cacti or trees, rock outcrops, and regulatory or informational signs. At these locations there are often large quantities of litter, including spent shells and target debris, broken bottles, cans, wooden pallets, appliances, computers, television sets, cardboard boxes, propane bottles, and abandoned vehicles. However, responsible recreational target shooting practices and irresponsible recreational target shooting practices differ. With removal of litter and preventing damage to SDNM resources, responsible recreational target shooting reduces this debris and damage to SDNM resources.

As described in **Chapter 1**, approximately 10,100 acres (2 percent of the decision area) are currently closed to recreational target shooting. The temporary closure area is generally located along the northern boundary of the North Maricopa Mountains Wilderness and south of the El Paso Natural Gas Company pipeline road in the northern portion of the SDNM.

Challenges for managing recreational target shooting are clearly related to increased urbanization next to BLM-administered lands, the need for public safety, and the protection of Monument objects and natural resources. Commonly, other recreation visitors are displaced when target shooters occupy an area. Initially, this displacement is a result of the sights and sounds of recreational target shooting; over time the lands commonly become too littered and denuded to attract visitors seeking a recreation experience that does not involve recreational target shooting.

Increasingly, Arizona's broad public demand for places to target shoot is being shifted to BLM-administered lands. Continued demographic changes in Arizona are straining the limits of where and how recreational target shooting can be

accommodated. For example, the Arizona State Lands Department has closed all its lands to recreational target shooting, the Tonto National Forest has closed 80,000 acres of Forest Service lands in the Phoenix area to recreational target shooting, and various Phoenix communities do not allow or no longer allow recreational target shooting within incorporated limits.

In 2007, the BLM internally canvassed its Arizona recreation management staff to identify issues arising from recreational target shooting (BLM 2007). At that time, staff noted the following, which are in order of priority:

- A concern for public health and safety of visitors engaged in non-target shooting activities and residents next to BLM-administered lands
- Accumulation of abandoned household solid waste, such as appliances and furniture used as targets, requiring funds for regular cleanups in the SDNM; such cleanups drain fiscal, labor, and volunteer resources and supplant other program priorities
- The gradual degradation or destruction of natural resources, such as intentional shooting of saguaro cactus, and Monument objects in protected landscapes, such as the SDNM
- Vandalism to SDNM and Monument signs and structures from their use as targets, and "drive-by" shotgunning to damage remote infrastructure, such as restroom doors and slump block walls
- Damage to natural resources or Monument objects down-range of target sites, such as visible depletion of plant cover over time on slopes, delimbing of downrange trees, damage to trees or saguaro cacti used to hang targets, and permanent pockmarking of rock outcrops due to gunfire

Since designation of the SDNM in 2001, impacts from recreational target shooting have increasingly become a management concern. Such impacts commonly include damage to protected plants, particularly saguaro cacti; areas denuded of vegetation, both at sites from which recreational target shooting occurs and at target areas; accumulation of debris used as targets, such as discarded appliances, propane bottles, glassware, furniture, automobile tires, paint cans, computers, TV and video displays, plywood, sheet metal, and insulation from cans; and posing a tempting opportunity to dispose of other forms of solid and hazardous waste. Computer displays and electronics can be full of lead and other toxic materials. The safety of other visitors, particularly with regard to inadequate backstops, is a concern as well.

Field observations by resource managers and law enforcement officers indicate recreational target shooting has become increasingly popular, especially near the growing fronts of the greater Phoenix metropolitan area (Hanson and Mahoney 2010), even in summer. New and more powerful firearms used by target

shooters may increase the public safety risk due to the distance that bullets can travel. In addition, more frequent and wide spread recreational use of automatic weapons has also been noted. Although there have been no reported incidents of specific harm to people, these activities remain largely unregulated and pose potential public safety risks.

During preparation of the 2012 RMP, the BLM attempted to forecast the suitability of recreational target shooting with respect to impacts on Monument objects across the SDNM. The approach used included inherent assumptions that disregarded site-specific levels of impacts. For example, for many inventoried recreation impact sites it relied on spatial data that could only identify the presence or absence of vegetation and wildlife habitat, rather than site-specific survey data. In addition, spatial data for natural slopes was at a scale unable to accurately identify adequate backstops. As a result, the approach was unable to accurately determine which portions of the SDNM were suitable for recreational target shooting. The approach also did not consider potential impacts to all Monument objects. Instead, it only focused on palo verde/mixed cacti, Sonoran desert tortoise, and the Juan Bautista de Anza NHT corridor. For these reasons, the previous suitability method is not being carried forward for use in this RMPA/EIS.

Population growth and associated development has resulted in changing opportunities for recreational target shooting. Target shooters are being pushed farther out from metropolitan areas, seeking private, state, and federal lands for recreational target shooting. Urban growth and development have made it increasingly difficult for target shooters to find unstructured areas without affecting other users or natural resources. It is harder yet to find settings that can absorb continued deposition of destroyed and abandoned targets without becoming eyesores with an associated and perhaps an irretrievable loss of natural or heritage resources, Monument objects, and wildlife habitat. This trend is expected to continue into the future.

3.3.4 Travel Management

Regional Travel Routes

Motorized vehicle travel is the dominant form of transportation throughout the SDNM. The principal highways used to reach the SDNM are I-8 and I-10, SR 84/347, and SR 85 (see **Figure 3-11**, Travel Management). Aside from I-8, Maricopa Road/SR 238 is the primary paved access roadway in the SDNM.

The main transportation trend affecting the SDNM is an expected continued increase in demand. The Phoenix metropolitan area has experienced a 9 percent population growth rate since 2010 (US Census 2016). Combined with improved off-road vehicle technology that allows access to more remote areas, a growing regional population is increasing the use of BLM-administered lands for recreational OHV use.

Figure 3-11
Travel Management

- Limited to Designated Routes
- Closed to Motorized Vehicles
- Designated Wilderness Area
- Sonoran Desert National Monument Boundary
- Roads, Primitive Roads, and Trails

Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
North Maricopa Mountains Wilderness
Juan Bautista de Anza NHT
Mobile
Maricopa
238
BLM Road 8004
Bosque
South Maricopa Mountains Wilderness
Maricopa County
Pinal County
347
Stanfield
84
Big Horn
8
Freeman
Table Top Wilderness
Vekol Valley Road

ARIZONA
Phoenix
Tucson
Map Location

Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_AE_TravelMGMT_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 5 10
Miles

Regional transportation network changes include upgrades to existing roads in and surrounding the SDNM; ROWs for freeways, arterials, and streets; access elimination in some areas and expansion in others due to new roads; and increasing demand for motorized vehicle access to BLM-administered lands as population grows. Changes to the planning area road system are detailed in the Maricopa Association of Government's (MAG) 2035 Regional Transportation Plan (MAG 2014).

The following is a description of planned highway and road projects expected to affect the SDNM:

CANAMEX Corridor—Segments of I-8 and SR 85 that pass through the SDNM are planned to be part of the CANAMEX Corridor, an international highway designed to promote commerce throughout North America (MAG 2003). The minimum duty rating for the CANAMEX Corridor is a four-lane, divided highway.

Arterial roads—MAG has outlined a plan to expand SR 238 to a four-lane, arterial connector, linking the communities of Gila Bend, Mobile, and Maricopa. Similarly, the El Paso Natural Gas Company pipeline road, linking Mobile to SR 85 and I-80, is planned to become a four-lane, arterial connector. These road expansions would increase the capacity of the regional travel network that provides access to the SDNM. Roadway improvement projects would increase existing public motorized and nonmotorized access to the SDNM where the improvements provide improved signage and turnoffs from the main roadways. Roadway improvements that emphasize through-travel often include adding lanes, raising the roadway surface, lowering the shoulder, and limiting the number of entrance and departure points from the roadway. These types of improvements could decrease the number of access points from the roadways to the SDNM. With regard to the proposed SR 238 enhancements and other regional improvements, MAG's 2035 Regional Transportation Plan (MAG 2014) indicates the potential for "major impacts on federal lands."

Existing Travel Management Situation

BLM guidance for travel management is found in the Travel and Transportation Manual (MS 1626) and the Travel and Transportation Handbook (H-8342-1).

The BLM manages trails primarily for nonmotorized transportation, but it can also include OHV use. The transportation system does not include transportation linear disturbances, which are user-created linear features, typically two tracks created by OHV users. The BLM considers any travel off designated routes as cross-country travel, which is prohibited in the SDNM.

Existing RMP decisions have designated BLM-administered lands in the SDNM as either limited to existing or designated routes, or closed to vehicle use. There are no open areas for cross-country vehicle use in the SDNM decision area (see **Table 3-12**, OHV Travel Management Allocations).

Table 3-12
OHV Travel Management Allocations

Designation	Acres
Open	0
Closed	159,100
Limited to designated routes	327,300
Total	**486,400**

Source: BLM GIS 2016

As newer OHV technology, such as rock crawlers, became common and OHV use increased in the SDNM, it experienced a proliferation of new linear disturbances throughout the early 2000s. In response to this trend, in 2008, the BLM issued a temporary emergency closure to restore damaged lands in the SDNM. The 54,817-acre closure area is north of SR 238, between the North Maricopa Mountains Wilderness and South Maricopa Mountains Wilderness, in the vicinity of the Anza NHT. The closure area extends from the western edge of the SDNM to Gas Pipeline Road at the northeastern boundary. There is no motorized vehicle use permitted in the closure area, which includes 83 miles of primitive roads in the decision area. This temporary closure will remain in effect until damaged natural and cultural resources are restored and adequate measures are in place to prevent damage from future OHV use.

The BLM completed an inventory of existing routes as part of the Travel Management Plan component of the 2012 RMP. The inventory included on-the-ground documentation of all routes in the SDNM, using global positioning system technology. Field crews noted the conditions and gathered basic information about each route using a statewide standard data dictionary.

The BLM interdisciplinary team then reviewed the inventory using a standardized method or "route evaluation process," to systematically identify resource concerns, values, and legal requirements associated with each route. This method allowed for the identification of both area-wide and site-specific issues. Each numbered route has a corresponding route report and database entry, detailing the findings from the evaluation process. The resulting travel management plan assigns formal route designations to inventoried roads, primitive roads, and trails in the SDNM (BLM 2012a).

There are 618 miles of inventoried routes in the decision area, 406 miles of which are available for public use; the remaining 212 miles (34 percent) are closed to public use. **Table 3-13**, below, summarizes the route designations for each asset type.

Table 3-13
Route Designations

Route Type and Designation	Miles
Road	**24**
Open	24
Limited (administrative use only)	<1
Primitive Road	**564**
Open	318
Limited (administrative use only)	8
Limited to nonmotorized use	8
Seasonally limited (closed April 15 to August 31)	26
Closed	204
Trail	**29**
Open to nonmotorized/mechanized travel (e.g., bicycles)	3
Open to nonmotorized/nonmechanized travel (wilderness trails)	26
Total Route Inventory	**618**

Motorized Vehicle Access

Motorized vehicle access to the SDNM is via primary and secondary highways, county or municipal roads and streets, and improved (though often unmaintained) roads from adjacent BLM-administered and other federal lands.

Local residents and visitors access and use the SDNM in different ways. Some areas are more popular for motorized travel, while others are more popular or are available only to nonmotorized travel modes. Local residents and visitors typically use four-wheel drive vehicles to access and recreate in the SDNM. Local residents typically access the SDNM from the east, via Highway 238 through Rainbow Valley, and adjacent lands near Mobile, using OHVs and horses for sightseeing and trail riding. Local residents from Gila Bend and other areas directly to the west access the SDNM via SRs 85 and 238. Visitors typically access the SDNM via motor vehicles from SRs 85 and 238 or via I-8.

Signs and maps orient visitors to popular SDNM locations, including historic places, trailheads, and scenic areas. Access to trailheads and other destinations in the SDNM is typically by motorized vehicle. Where the temporary closure is in effect, visitors are instructed to seek other areas for dispersed recreation. In designated wilderness areas, there is only nonmotorized access for hiking, exploring, hunting, and dispersed camping.

The access routes include a limited number of legally established public ROWs and non-public routes. Some of these routes cross state trust or private lands, where public vehicle travel is not authorized. Although there are no physical barriers or posted notices denying public access, this situation can change at any time, cutting off critical access points for visitors and administrative personnel to reach the SDNM. Accordingly, there is limited legal public access in several key geographical areas of the SDNM. Continued access depends on other

landowners or jurisdictional agencies. Obtaining legal public access is necessary to ensure future access to the SDNM.

There are 83 miles of existing dirt-surfaced routes in the Juan Bautista de Anza NHT RMZ portion of the SDNM that are temporarily closed to motorized use. The closures account for 15 percent of the available public vehicle routes in the SDNM. The closures, which took effect in May 2008, will remain in place until the BLM can adequately restore damaged soils and vegetation caused by the creation of multiple OHV tracks. The BLM is also developing strategies to prevent further damage.

There is limited motorized access to the Desert Backcountry RMZ portion of the SDNM, particularly within the North Maricopa Mountains, South Maricopa Mountains, and Table Top Wilderness Areas, where motorized travel is prohibited. There are two legal access points to the SDNM from I-8 at Exits 140 and 144. There are several motorized access points from SR 238 near the SDNM's western boundary.

Nonmotorized Travel

Nonmotorized travel includes pedestrian, equestrian, and bicycling activities. Public access to the decision area by pedestrian or equestrian travel, from external areas cross-country, is permissible wherever public use of adjacent lands is legally authorized.

A number of nonmotorized trails are designated for hiking and equestrian use; mechanized uses, such as bicycling, are prohibited on these trails. Pedestrian and equestrian activities are permitted in the wilderness areas, while all mechanized modes of travel, including bicycles, are prohibited. Nonmotorized, wheeled carriers may be used for cross-country game retrieval anywhere in the SDNM, except in wilderness areas where they are prohibited.

There has been an increase in demand for nonmotorized travel in the SDNM as the regional population grows. Use of designated trails and dispersed hiking, backpacking, and equestrian uses are steadily increasing. There has been little change in the level of bicycle use in the SDNM.

Development of private property and state trust land next to or in the vicinity of the SDNM has reduced physical, and possibly legal, access for motorized and nonmotorized use. There are four designated trails in the SDNM. Two trails, the nearly nine-mile Margie's Cove Trail and the six-mile Brittlebush Trail, are in the North Maricopa Mountains Wilderness. The other two trails are in the Table Top Wilderness. These trails include the 7.25-mile Lava Flow Trail and 3.5-mile Table Top Trail.

Phase III of the Maricopa County Regional Trail System Plan (Maricopa County 2004) identifies a primary, county trail loop that incorporates Estrella Mountain and Buckeye Hills regional parks and Phoenix's South Mountain Park. This trail

traverses the East Buckeye Hills area directly north of the SDNM. The county may consider additional options to link other parts of the SDNM to the regional trail system.

3.4 Special Designations

3.4.1 National Conservation Lands

In June 2000, the BLM created the National Landscape Conservation System (NLCS) to emphasize the conservation identity of the agency and to focus management effectiveness and integrity for component areas of the NLCS. Today, referred to as the National Conservation Lands, it includes the BLM's premier designations: national monuments, national conservation areas, wilderness areas, wilderness study areas, wild and scenic rivers, and national, historic, and scenic trails. By placing these lands into this organized system, the BLM has increased public awareness of these areas' scientific, cultural, educational, ecological, and other "monument" resource values.

Inclusion in the National Conservation Lands does not create new legal protections for these lands; however, the lands themselves are specially designated by Presidential or Congressional action. BLM field offices are given the responsibility to manage these lands within the direction provided by the proclamation or law designating them.

The purpose of the SDNM designation is to protect and manage the SDNM's natural, geologic, and cultural resources (i.e., SDNM objects) for long-term conservation, and to further our knowledge and understanding of such resources through scientific research and interpretation.

The SDNM was specifically designated to protect the following resources:

- A large Sonoran Desert landscape that connects to other large natural areas
- The ecological diversity of the Sonoran Desert, including a diversity of flora and fauna associated with rare woodlands assemblages, palo verde/mixed cacti, creosote-bursage, desert washes, and rare desert grasslands vegetation communities
- A cultural landscape that appears largely unchanged, with a rich history that spans at least 10,000 years, from the Archaic to modern day

The SDNM objects are described in the text of Presidential Proclamation 7397. **Table 3-14** further clarifies the objects and identifies specific protection criteria for each object or set of objects.

Table 3-14
Sonoran Desert National Monument Objects

Object as Described in Presidential Proclamation 7397	Object	Characteristics	Protection Criteria
"The Sonoran Desert National Monument is a magnificent example of untrammeled Sonoran Desert landscape. The area encompasses a functioning desert ecosystem with an extraordinary array of biological, scientific, and historic resources. The most biologically diverse of the North American deserts, the Monument consists of distinct mountain ranges separated by wide valleys, and includes large saguaro cactus forest communities that provide excellent habitat for a wide range of wildlife species."	Functioning desert ecosystem	**Physical:** Distinct mountain ranges separated by wide valleys **Ecological:** Sonoran Desert landscape, with properly functioning desert ecosystem, large saguaro cactus forest communities, habitat for a wide range of wildlife species	Prevent avoidable soil loss. Maintain properly functioning plant communities, defined by structure, cover, diversity, composition, and presence or absence of invasive species.
"The Monument's biological resources include a spectacular diversity of plant and animal species. The higher peaks include unique woodland assemblages, while the lower elevation lands offer one of the most structurally complex examples of palo verde/mixed cacti association in the Sonoran Desert. The dense stands of leguminous trees and cacti are dominated by saguaros, palo verde trees, ironwood, prickly pear, and cholla. Important natural water holes, known as tinajas, exist throughout the Monument. The endangered acuña pineapple cactus is also found in the Monument."	Diversity of plant and animal species	**Biological:** Saguaros, palo verde trees, ironwood, prickly pear, cholla, acuña pineapple cactus **Physical:** Tinajas **Ecological:** Woodland assemblages, structurally complex palo verde/mixed cacti association, dense stands of leguminous trees and cacti	Maintain normal variation in plant composition, diversity, and abundance of native species, diversity of niches, and landscape-level structural complexity.
"The most striking aspect of the plant communities within the Monument are [sic] the abundant saguaro cactus forests. The saguaro is a signature plant of the Sonoran Desert. Individual saguaro plants are indeed magnificent, but a forest of these plants, together with the wide variety of trees, shrubs, and herbaceous plants that make up the forest community, is an impressive site [sic] to behold. The saguaro cactus forests within the Monument are a national treasure, rivaling those within the Saguaro National Park."	Saguaro cactus forests	**Biological:** Saguaro **Ecological:** Plant communities; saguaro cactus forests; wide variety of trees, shrubs, and herbaceous plants	Maintain age class and stand structure and density. Ensure suitable nurse plants are present and saguaro recruitment is adequate for cactus forest sustainability.

Table 3-14
Sonoran Desert National Monument Objects

Object as Described in Presidential Proclamation 7397	Object	Characteristics	Protection Criteria
"The rich diversity, density, and distribution of plants in the Sand Tank Mountains area of the Monument is especially striking and can be attributed to the management regime in place since the area was withdrawn for military purposes in 1941. In particular, while some public access to the area is allowed, no livestock grazing has occurred for nearly 50 years. To extend the extraordinary diversity and overall ecological health of the Sand Tanks [sic] Mountains area, land adjacent and with biological resources similar to the area withdrawn for military purposes should be subject to a similar management regime to the fullest extent possible."	Sand Tank Mountains	**Physical:** Sand Tank Mountains **Ecological:** Diversity, density, and distribution of plants	Maintain normal variation in diversity, density, and distribution of plants.
"The Monument contains an abundance of packrat middens, allowing for scientific analysis of plant species and climates in past eras. Scientific analysis of the midden [sic] shows that the area received far more precipitation 20,000 years ago, and slowly became more arid. Vegetation for the area changed from juniper-oak-pinion pine woodland to the vegetation found today in the Sonoran Desert, although a few plants from the more mesic period, including the Kofa Mountain barberry, Arizona rosewood, and junipers, remain on higher elevations of north-facing slopes."	Scientific analysis of plant species and climates	**Biological:** Packrat middens, mesic period, Kofa Mountain barberry, Arizona rosewood, junipers	Protect packrat middens, dry caves or rock shelters, and relic species; within established guidelines, make middens available for scientific study and analysis.
"The lower elevations and flatter areas of the Monument contain the creosote-bursage plant community. This plant community thrives in the open expanses between the mountain ranges, and connects the other plant communities together. Rare patches of desert grassland can also be found throughout the Monument, especially in the Sand Tank Mountains area. The washes in the area support a much denser vegetation community than the surrounding desert, including mesquite, ironwood, palo verde, desert honeysuckle, chuperosa, and desert willow, as well as a variety of herbaceous plants. This vegetation offers the dense cover bird species need for successful nesting, foraging, and escape, and birds heavily use the washes during migration."	Vegetation communities: Creosote bush-bursage, desert grassland, and washes	**Biological:** Mesquite, ironwood, palo verde, desert honeysuckle, chuperosa, desert willow, herbaceous plants **Physical:** Sand Tank Mountains **Ecological:** Creosote-bursage plant community, desert grassland, densely vegetated wash communities	Prevent avoidable soil loss. Maintain properly functioning plant communities, as defined by structure, cover, diversity, composition, invasive species, desert washes-bank stability, woody over story, and continuity of vertical structure.

Table 3-14
Sonoran Desert National Monument Objects

Object as Described in Presidential Proclamation 7397	Object	Characteristics	Protection Criteria
"The diverse plant communities present in the Monument support a wide variety of wildlife, including the endangered Sonoran pronghorn, a robust population of desert bighorn sheep, especially in the Maricopa Mountains area, and other mammalian species such as mule deer, javelina, mountain lion, gray fox, and bobcat. Bat species within the Monument include the endangered lesser long-nosed bat, the California leaf-nosed bat, and the cave myotis. Over 200 species of [song] birds are found in the Monument, including 59 species known to nest in the Vekol Valley area. Numerous species of raptors and owls inhabit the Monument, including the elf owl and the western screech owl. The Monument also supports a diverse array of reptiles and amphibians, including the Sonoran Desert tortoise and the red-backed whiptail. The BLM has designated approximately 25,000 acres of land in the Maricopa Mountains area as critical habitat for the desert tortoise. The Vekol Valley and Sand Tank Mountain areas contain especially diverse and robust populations of amphibians. During summer rainfall events, thousands of Sonoran green toads in the Vekol Valley can be heard moving around and calling out."	Wildlife	**Biological:** Sonoran pronghorn, desert bighorn sheep, mule deer, javelina, mountain lion, gray fox, bobcat, bat species (including lesser long-nosed bat, California leaf-nosed bat, and cave myotis), 200 species of songbirds, raptors, owls (including elf owl and western screech owl), red-backed whiptail, Sonoran green toads, critical habitat for Sonoran desert tortoise **Physical:** Maricopa Mountains, Vekol Valley, Sand Tank Mountains **Ecological:** Diverse plant communities	Maintain viable populations of wildlife species, focusing, as appropriate, on foraging habitat, hiding cover, nesting/roosting habitat, escape cover, and thermal cover. Prevent avoidable loss of special status species.
"The Monument also contains many significant archaeological and historic sites, including rock art sites, lithic quarries, and scattered artifacts. Vekol Wash is believed to have been an important prehistoric travel and trade corridor between the Hohokam and tribes located in what is now Mexico. Signs of large villages and permanent habitat sites occur throughout the area, and particularly along the bajadas of the Table Top Mountains. Occupants of these villages were the ancestors of today's O'odham, Quechan, Cocopah, Maricopa, and other tribes. The Monument also contains a much used trail corridor 23 miles long in which are found remnants of several important historic trails, including the Juan Bautista de Anza NHT, the Mormon Battalion Trail, and the Butterfield Overland Stage Route."	Archaeological and historic sites	**Cultural:** Archaeological and historic sites, rock art sites, lithic quarries, scattered artifacts, large villages, permanent habitat sites, Anza NHT corridor, Mormon Battalion Trail, Butterfield Overland Stage Route **Physical:** Vekol Wash, bajadas, Table Top Mountains	Reduce threats and resolve conflicts from natural and human-caused degradation affecting integrity of sites and settlement clusters, site condition context, setting, stability, and capacity to yield scientific information. For the Anza Trail, reduce threats related to the historic trail corridor, its setting, and loss of interpretative opportunities

Each type of special designation has been used to establish special management areas on BLM-administered lands within the planning area (see **Table 3-15**).

Table 3-15
Special Designations in the Planning Area

Designation	Size (Acres/Miles)	Designating Authority	Date Designated
Presidential Designations			
Sonoran Desert National Monument	496,400 acres	Presidential Proclamation No. 7397 by President William J. Clinton	2001
Congressional Designations			
North Maricopa Mountains Wilderness	64,200 acres	Arizona Desert Wilderness Act of 1990 (Public Law 101-628)	1990
South Maricopa Mountains Wilderness	60,400 acres	Arizona Desert Wilderness Act of 1990 (Public Law 101-628)	1990
Table Top Wilderness	34,500 acres	Arizona Desert Wilderness Act of 1990 (Public Law 101-628)	1990
Juan Bautista de Anza NHT	17 miles	Juan Bautista de Anza NHT Act (Public Law 101-365)	1990

Note: The Butterfield Overland Stage Route is under study by the NPS for Congressional designation.

Besides the SDNM itself, there are four national conservation land designations in the Sonoran Desert National Monument: the North Maricopa Mountains Wilderness, the South Maricopa Mountains Wilderness, the Table Top Wilderness, and the Juan Bautista de Anza NHT.

3.4.2 Congressional Designations

Wilderness Areas

The decision area includes three wilderness areas designated by the Arizona Desert Wilderness Act of 1990: the North Maricopa Mountains, South Maricopa Mountains, and Table Top Wilderness areas, a total of 159,100 acres. Each wilderness area has its own management plan, and management guidance is provided under the Maricopa Complex Wilderness Management Plan (BLM 1995).

A five-year evaluation of the Maricopa Complex Wilderness Management Plan, completed in 2005, made the following observations:

Motorized use of the Maricopa Complex was authorized 91 times, principally for the inspection, maintenance, and redevelopment of rainwater catchments for wildlife, and such authorizations have decreased substantially as the catchments were upgraded. Monitoring for naturalness, solitude, and visitor encounter standards was attempted by several visitor-tracking methods; however, monitoring of standards for vegetation, trail width, and depth, frequency of manure on trails, grazing of vegetation, and plant density was not accomplished

as planned. Of the 70 planned 'special project' wilderness management activities, 2 of 18 vehicle routes identified for active reclamation were completed; 23 of 26 planned vehicle barriers were completed; all 6 trail and trailhead development projects were completed; and 9 of 20 'other special projects' were completed, including 4 wildlife water catchment redevelopments. In total, 57 percent of planned 'special projects' were implemented, and largely represented high-priority vehicle and people management projects intended to ensure compliance with the Wilderness Act. … Visitation data indicate that the visitor standards adopted by the Plan have adequately met public expectations. The Plan was amended twice to provide for the use of mechanized equipment for vehicle way rehabilitation and the capture and removal of desert bighorn sheep for release in other areas of the state (BLM 2005).

Recreational target shooting may be considered primitive and unconfined recreation that is not inherently incompatible with management of areas for wilderness characteristics (or as designated wilderness).

Unauthorized activities that do not conform to wilderness values (e.g., unauthorized entry by motor vehicles) occur occasionally; nevertheless, the above summary of the 5-year plan evaluation indicates that the four wilderness areas of the Maricopa Complex (North Maricopa Mountains, Sierra Estrella, South Maricopa Mountains, and Table Top) have been successfully managed as envisioned by the Maricopa Complex Wilderness Management Plan (BLM 1995).

No significant threats to wilderness values have been detected by BLM staff on their occasional field visits to these wilderness areas.

Recent regional trends in general population growth, public demand for outdoor recreation, emerging conflicts between types of outdoor recreation, and illegal immigration pose the potential for substantial impacts on the values of wilderness in the decision area. This is anticipated to be particularly true for impacts resulting from the unauthorized use of motor vehicles in wilderness areas associated with recreation, illegal immigration, and smuggling.

Visitation data collected in the Maricopa Complex indicates yearly increases in trailhead visitation; however, visitation remains low, in comparison to wilderness areas closer to urban areas.

Juan Bautista de Anza National Historic Trail

The Juan Bautista de Anza NHT is a 1,200-mile historic trail corridor. It commemorates the 1775-1776 land route that Spanish commander Juan Bautista de Anza took from New Spain through what is now Arizona to California in an effort to establish a mission and presidio on San Francisco Bay. Although historians have researched the diaries and journals of the people that followed this trail in the eighteenth century, only a few segments can be tied to a specific topographic feature. Although this trail has no known surviving trail signature on the ground, several other historic trails lie within the corridor that crosses

through SDNM. This means that portions are considered a multi-component historic trail with associated sites.

These historic trails have a trail signature from wagons and stagecoaches of the mid-nineteenth century. Where this trail signature coincides with the NHT corridor results in a natural fit for identifying and interpreting all of these trails together. While the Anza NHT is a historic trail corridor, the later trails have artifacts, features, and associated historic sites that are more obvious. Moreover, they contain more visible trail signature and corridor area to interpret and protect.

Certain segments of the NHT that traverse the planning area are considered to be among the best preserved corridor segments and most representative of the historic trail corridor conditions.

Since the NHT's designation in 1990, Anza friends groups, the NPS, other agencies, and the BLM have collaborated to develop and mark segments of the historic trail. The BLM marked a 12.5-mile segment of the trail through the Maricopa Mountains in SDNM during the late 1990s. The vision for the NHT is that it will gradually become a long-distance recreational trail that the public can access, and that some private developers will incorporate the trail and surrounding landscape into their development plans.

The prevailing conditions of the Juan Bautista de Anza NHT through the SDNM have been generally maintained since the NHT's designation in 1990. Current management guidance for the entire length of the NHT is provided by the Comprehensive Management and Use Plan for the Juan Bautista de Anza NHT (NPS 1996). The section of NHT in the SDNM is managed in accordance with the BLM RMP (BLM 2012). This plan was prepared by the NPS and cooperating agencies, which included the BLM. The NPS (2003) also prepared the Long-Range Interpretive Plan for the Juan Bautista de Anza NHT. These plans are still in place and form the basis for implementing trail segment identification, protection strategies, and interpretive projects.

Designation of the SDNM placed an additional layer of protection on the NHT segment through the SDNM. The NHT and other underlying historic trails (e.g., the Butterfield Overland Stage Route and the Mormon Battalion Trail) are all named Monument objects and all follow the same corridor. The Butterfield Overland Stage Route is currently under study by the NPS per Public Law 111-11 and is managed so that there is no substantial interference to the nature and purposes of the trail.

Threats to the NHT include increasing motorized recreation use, particularly near population centers. These threats were realized in 2008 when the NHT and the access routes leading to it became unacceptably degraded by damage due to improper OHV use. A temporary closure in the fall of 2008 was followed by intensive restoration and repair work to address the excessive damage to the

historic trails, vegetation, soils, and historic trail corridor setting. Additional information on recreation management along the trail corridor in the decision area is provided in **Section 3.3.2**, Recreation Management.

Over the long term, there will continue to be the challenge of protecting the trail from visitor overuse and unauthorized visitor activities. The dramatic population growth projected for the Phoenix metropolitan area and the urban development expected in the vicinities of various NHT segments in the planning area indicates that this challenge will become increasingly complex. This population growth will lead to increased pressure to access the trail for recreation. Moderate to high levels of use are expected over the life of the plan.

In the planning area, an additional threat is the loss of the opportunity to protect the trail corridor as private and state trust lands are developed. Collaborative projects with Anza NHT friends groups and local communities will be the avenue through which additional pieces of the trail might be certified as official NHT segments. This might involve local groups or federal agencies acquiring easements and lands.

The Juan Bautista de Anza National Historic Trail is a historic trail corridor based on the journals and diaries of Anza and Fr. Font (1775). When the Lower Sonoran Field Office prepared and finalized the Approved RMP in 2012, two Management Areas were allocated for the Anza NHT.

The location of the Anza NHT Management Area was based on the Congressionally designated Anza route, BLM inventories, and GIS view-shed analysis. A Management Area encompasses the Historic Trail that qualifies as a "high potential route segment: and / or has a "high potential historic site" within of along it. "High potential route segments" area portions of the trail that would afford a high quality recreation experience in a portion of the route having greater than average scenic values or affording an opportunity to vicariously share the experience of the original users of a historic route. A "high potential site" is a site that is related to the route or a site in close proximity with the route, which provides opportunity to interpret the historic significance of the trail during the period of its major use. The Management Area encompasses the entire length of the Historic Trail corridor in the SDNM.

A National Historic Trail Management Area is defined in the LSFO / SDNM as an area extending three miles out or to the visual horizon from the NHT corridor. The area extending east or west, beyond the SDNM boundaries have developmental pressures due to utility corridors, land fill facility, and Arizona State Lands that have entry restrictions. Within the SDNM, the visitor has the opportunity to have a high quality recreational and possible vicarious experience along this segment of the NHT. The scenic settings, the distance from modern development and potential for solitude is outstanding.

3.5 Social and Economic Conditions

3.5.1 Tribal Interests

Tribal interests in the SDNM are as varied and wide ranging as those of non-tribal groups. Tribes, because of their native heritage, also have unique concerns about places and resources of traditional and cultural interest. The frequency of BLM cultural resources consultations has increased over the last decade for the SDNM and surrounding areas. Increased tribal consultation, however, has not led to any systematic inventory of traditional tribal interests or concerns in the SDNM. The reasons for this are varied. Many tribes consider discussion or description of traditional cultural places or practices to non-tribal members to be inappropriate. Some tribes are losing knowledge as less and less traditional knowledge is passed to succeeding generations. Many tribes feel that information concerning traditional cultural places and practices is confidential, and should not be disclosed. Due to these and other reasons, the BLM is not able to specify exactly where some traditional places are, or specifically which traditional tribal practices may be impacted by a given decision. Many federally recognized Tribes in the greater Southwest are concerned about preserving archaeological sites, which many Tribes consider to be ancestral places. Tribes have also expressed a high level of concern about protecting cultural sites containing or likely to contain human remains. Some tribal groups continue to collect natural resources, such as plant materials traditionally used for food, medicine, ceremonies, or crafts. They are concerned about maintaining access to certain areas on BLM-administered lands to collect such items and for conducting ceremonies.

Several tribes have traditional cultural affiliations with the SDNM. The BLM sent formal consultation letters and made follow-up telephone calls to the Ak-Chin Indian Community, Gila River Indian Community, the Hopi Tribe, Salt River Pima-Maricopa Indian Community, and the Tohono O'odham Nation.

Four O'odham-speaking groups, related linguistically and culturally, continue to reside on reservations near the boundaries of the SDNM: the Ak Chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O'odham Nation. Spanish explorers encountered these peoples when they entered southern Arizona in the late seventeenth century. These indigenous groups consider themselves descendants of the prehistoric groups who occupied the region.

It is understood that tribal interests in the SDNM are part of a larger landscape that includes ancestral archaeological sites, traditional use areas and cultural resources, and places of religious importance that may extend beyond administrative boundaries. However, there is insufficient information to speculate on the full scope and location of such interests for multiple federally recognized tribes that claim ancestral affiliation to the SDNM and surrounding areas.

Archaeologists and historians refer to the region around the SDNM as the Papagueria. It was the core area traditionally used by O'odham-speaking groups, who adapted to life in the Sonoran Desert. The SDNM is a small portion of the Papagueria, but it is important to these groups. Songs and stories of the landscape are an integral part of the traditional lifeway of the people.

Consultation with the Gila River Indian Community and the other O'odham-speaking indigenous groups, has resulted in some new understanding about a historic, traditional trail route called the Komatke Trail. This trail is a route connecting the historical Piman villages of Oxibahibuiss and Comac/Komatke (Darling and Eiselt 2009). The Gila River Indian Community has been performing in-depth research and field investigation to document any physical traces of this trail. The route is described in the Oriole Song, a traditional Akimel O'odham song series known by many in the Gila River Indian Community (Darling 2009). The Oriole song creates a song-scape by describing the traveler's movement along this route from east to west as the sun moves in the daytime and then back from west to east as it moves through the underworld at night or through fire (Darling 2009). This type of song has geographical information in it as well as traditional knowledge that the traveler must learn to follow (Darling and Lewis 2007). There are more than 100 songs that chart a journey over at least 280 miles from their villages along the upper Gila River all the way to particular salt flats in Sonora (Darling and Lewis 2007).

There have been no physical traces of this trail observed within the Sonoran Desert National Monument. Physical traces have been documented on the western slope of the Sierra Estrella Mountains and in some areas near State Route 85. It is likely that this trail route came through the northern tip of what is now the SDNM.

Traditional histories of some Hopi Tribe clans indicate they came from the south and have traditional cultural affiliations with the prehistoric occupants of southern Arizona. The Hopi have expressed interest in the cultural resources in the entire state of Arizona, including the SDNM.

The SDNM is used by tribes as an area for gathering seasonal traditional food sources The extent of the use of plant materials as traditional food or material sources is not known. However, in general, plant materials that might be of interest are unlikely to be collocated with heavily used shooting sites.

3.5.2 Hazardous Materials and Public Safety

Government records document known and recognized sites of reported hazardous materials and wastes. These sites include facilities that handle hazardous materials and, in some cases, produce hazardous wastes. Most of the facility managers in the planning area successfully manage the use of these products and wastes, but activities at some facilities can contaminate soil, water, and air.

Although facilities using hazardous materials, housing underground storage tanks, and producing hazardous wastes are in the planning area, no contaminated sites on BLM-administered lands in the SDNM are privately owned. There is one state-owned site on state property next to the SDNM where millions of discarded tires are stored. The State of Arizona is attempting to remediate the site.

The BLM assesses hazardous-waste contamination when suspected or discovered on BLM-administered land in the planning area. As risks to human health and the environment are determined, the BLM would take appropriate action to remove the contamination and remediate the area, as appropriate and feasible.

Recreational Target Shooting

From a hazardous materials standpoint, popular recreational target shooting sites have the potential for accumulating contaminants of concern (COC), such as lead, arsenic, antimony, copper and zinc, in and upon soils containing spent bullets and cartridge cases. Recreational target shooting in the SDNM is less frequent and more widely dispersed than on established target shooting ranges, where best management practices must be routinely implemented to prevent COC levels that could exceed regulatory guidelines and cause potential impacts on humans and wildlife. Heavy metals such as lead tend to be relatively immobile in soil; however, natural physical and chemical processes (e.g. wind, erosion, and dissolution) can cause metal contamination to migrate. The alkaline soil conditions typical of a desert environment like the SDNM, generally prevent any significant subsurface migration of metals.

In 2015, a team of environmental engineering students from Northern Arizona University, working under an assistance agreement with the BLM, sampled the soils at 15 informal recreational target shooting sites in the SDNM. The resulting report (Preliminary Assessment/Focused Site Inspection, Sonoran Desert National Monument, Maricopa County, Arizona, May 2015) indicates that at least one sample from each of six of the 15 sites contained levels of lead exceeding the Arizona Department of Environmental Quality (ADEQ) non-residential Soil Remediation Level (nrSRL) of 800 mg/kg. Also, at least 1 sample from 2 of the 15 sites contained levels of arsenic exceeding the nrSRL of 10 mg/kg. All of the sites appear to contain levels of the COCs antimony, copper, zinc, and tin below their respective nrSRLs.

As part of the study, the students completed a human health risk assessment for the sites for both adult and child receptors. Based on the exposure assumptions used in the study, the students concluded that risks were within acceptable limits for recreational users and volunteer site cleanup workers. An ecological risk assessment was not conducted; however, the students cited several outside sources that have examined the potential effects of lead on flora and fauna species present within the SDNM. Completing an ecological risk assessment

(i.e., assessing the risk of exposure to humans and/or wildlife) would be an integral part of any future work at these sites.

Other Hazards

In addition to hazardous materials and waste risks, other issues affecting public safety are natural and human-made hazards. These include abandoned mines, motor vehicles operated on roads and primitive BLM roads, unsafe recreational target shooting, and cross-border smuggling. In general, abandoned mine-related public safety trends are static. For other hazards, associated risks may increase over time, because more people are visiting and using BLM-administered lands.

Recreational target shooting debris, household waste, and human waste are found in the highest concentrations at campsites, trailheads, and other high-use areas. Incidences of littering from recreational users have increased, with further increases likely as recreational activities increase.

3.5.3 Socioeconomics and Environmental Justice

Socioeconomics and Environmental Justice

This section provides an overview of the social and economic conditions of the study area (described below). This discussion of social and economic conditions is presented relative to those resources directly or indirectly impacted by recreational target shooting in the SDNM. For a more comprehensive summary of social and economic conditions within the study area, the reader is referred to the Socioeconomic Baseline Assessment, which was prepared as a separate document as part of the data acquisition process for the RMPA. The Baseline Assessment can be found on the project website at http://l.usa.gov/lZPyFSA.The study area extends beyond the RMPA/EIS planning area and encompasses the counties of Pima, Maricopa, and Pinal. These counties were chosen as the study area, because they are the area most likely to be impacted by proposed management decisions. Counties are selected as the units of analysis, because most publicly available data is collected at the county level.

Information presented here has been obtained from a variety of sources, including data from the BLM and other state and federal agencies, statistical data sources, public scoping process responses (BLM 2016c), and input gathered at the economic strategy workshop conducted in August 2016.

Regional Demographics and Economic Context

Population

The three-county socioeconomic study area includes Maricopa, Pima, and Pinal counties. It also encompasses the Phoenix-Mesa-Chandler Metropolitan Statistical Area (which is made up of Maricopa and Pinal counties). In 2000, total population in the three counties was 4,095,622, with Maricopa County making up 75 percent of that population at 3,072,149. In 2014, the county region (consisting of Pima, Maricopa, and Pinal Counties) population grew 30.2 percent

to 5,330,686. All counties in the study area, as well as the overall population of Arizona, are experiencing growth. In particular, Pinal County experienced the fastest rate of growth over that 14-year period, growing by 117.1 percent (Headwater Economics 2016 utilizing data from the US Census Bureau).

Population size and density influences the number of individuals seeking recreational opportunities in any given area. With increasing populations, there could be a higher demand for recreational opportunities in the study area.

Employment

In 2014, the largest employment sectors within the study area were retail trade (10.8 percent), health care and social assistance (10.8 percent), and government (11.4 percent). From 2001 to 2014, employment decreased in the retail trade sector, increased in the health care and social assistance sector, and fluctuated in the government sector. Employment in nonservice sectors is declining over time while employment in service-related sectors is increasing. In 2014, the employment sectors with the largest earnings within the study area were manufacturing (8.5 percent), finance and insurance (8.4 percent), professional and technical services (8.4 percent), health care and social assistance (12.2 percent), and government (14.9 percent). Earnings for all of these sectors are increasing over time except for manufacturing, which is decreasing (Headwater Economics 2016).

Table 3-16, Employment in Travel and Tourism in 2014, shows employment in the travel and tourism industry. Employment in this sector is particularly relevant to the decisions being considered in this RMPA/EIS. In the RMPA/EIS, the BLM will consider how decisions regarding recreational target shooting could impact the travel and tourism industry in the study area. The Three-County Region noted in the table refers to Maricopa, Pima, and Pinal Counties.

Labor income is the main source of income for all study area counties. However, nonlabor income from rent, dividends, and other sources provides a significant percentage of income for some counties. The percentage of nonlabor income in study area counties is similar to the state level (38.6 percent), with slightly higher levels in Pima County (45.2 percent) and Pinal Counties (40.4 percent) and the lowest in Maricopa County (34.4 percent). For the county region, almost the same amount of nonlabor income comes from dividends, interest, and rent (18.0 percent) as from transfer payments (18.6 percent). A similar ratio is seen in the state comparison population (Headwater Economics 2016). Proximity of public lands can attract retirees and others with sources of nonlabor income.

Nonmarket Values

The recreational opportunities provided by public lands are valued by many individuals and groups. The values placed on recreational opportunities by users are often termed "non-market" values. Some of the most important

Table 3-16
Employment in Travel and Tourism in 2014

Employment Sector	Pima County	Maricopa County	Pinal County	Three-County Region	Arizona
Travel & Tourism Related	60,610 (~)	263,613 (~)	9,029 (~)	333,252 (~)	395,011 (~)
	19.9% (~)	*17.3% (~)*	*19.5% (~)*	*17.7% (~)*	*17.6% (~)*
Retail Trade	10,770	44,549	1,464	56,783	68,978
	3.5%	*2.9%*	*3.2%*	*3.0%*	*3.1%*
Gasoline Stations	2,225	9,361	888	12,474	18,084
	0.7%	*0.6%*	*1.9%*	*0.7%*	*0.8%*
Clothing and Accessory Stores	5,788	23,235	295	29,318	32,925
	1.9%	*1.5%*	*0.6%*	*1.6%*	*1.5%*
Miscellaneous Store Retailers	2,757	11,953	281	14,991	17,969
	0.9%	*0.8%*	*0.6%*	*0.8%*	*0.8%*
Passenger Transportation	802 (~)	11,927 (~)	10 (~)	12,739 (~)	10,747 (~)
	0.3% (~)	*0.8% (~)*	*0.0% (~)*	*0.7% (~)*	*0.5% (~)*
Air Transportation	786	11,807 (~)	2 (~)	12,595 (~)	10,000 (~)
	0.3%	*0.8% (~)*	*0.0% (~)*	*0.7% (~)*	*0.4% (~)*
Scenic and Sightseeing Transport	16 (~)	120	8 (~)	144 (~)	747
	0.0% (~)	*0.0%*	*0.0% (~)*	*0.0% (~)*	*0.0%*
Arts, Entertainment, and Recreation	6,036	29,921	1,262 (~)	37,219 (~)	42,507
	2.0%	*2.0%*	*2.7% (~)*	*2.0% (~)*	*1.9%*
Performing Arts and Spectator Sports	1,065	5,181	423 (~)	6,669 (~)	7,152
	0.4%	*0.3%*	*0.9% (~)*	*0.4% (~)*	*0.3%*
Museums, Parks, and Historic Sites	361	1,498	20 (~)	1,879 (~)	2,271
	0.1%	*0.1%*	*0.0% (~)*	*0.1% (~)*	*0.1%*
Amusement, Gambling, and Rec.	4,610	23,242	819	28,671	33,084
	1.5%	*1.5%*	*1.8%*	*1.5%*	*1.5%*
Accommodation and Food	43,002	177,216	6,293 (~)	226,511 (~)	272,779
	14.2%	*11.6%*	*13.6% (~)*	*12.1% (~)*	*12.2%*
Accommodation	9,335	26,598	1,334 (~)	37,267 (~)	49,573
	3.1%	*1.7%*	*2.9% (~)*	*2.0% (~)*	*2.2%*
Food Services and Drinking Places	33,667	150,618	4,959	189,244	223,206
	11.1%	*9.9%*	*10.7%*	*10.1%*	*10.0%*
Non-Travel & Tourism	243,231 (~)	1,264,186 (~)	37,179 (~)	1,544,596 (~)	1,846,066 (~)
	80.1% (~)	*82.7% (~)*	*80.5% (~)*	*82.3% (~)*	*82.4% (~)*
Total Private Employment	**303,841**	**1,527,799**	**46,208**	**1,877,848**	**2,241,077**

Source: Headwaters Economics 2016
Note: Estimates for data that were not disclosed are indicated with tildes (~).

socioeconomic factors of BLM-administered lands may be non-market values. Nonmarket values are the benefits derived by individuals and society from the uses or experiences that are not dispensed through markets and do not require payment (i.e., value that does not have a clear monetary equivalent). These

values enhance the quality of life and enjoyment of a place, which may attract more visitors and higher use, which in turn may affect local and regional economic conditions.

Proximity to undeveloped natural lands, including scenic vistas, open spaces, and recreational and wildlife viewing opportunities, may add to the non-market value of an area for many people.

During public scoping, commenters noted that informal, recreational, target shooting benefits the quality of life of many Arizonans; maintains family traditions that have "always" included recreational target shooting; and teaches children how to handle firearms responsibly and shoot in an outdoor environment at a relaxed pace, rather than in a stressful and loud shooting range environment (BLM 2016c). Preservation of tradition and having the option or opportunity to participate in an activity (e.g., recreational target shooting) are nonmarket values.

BLM Contributions to Social and Economic Conditions

Recreation

The principal recreational activities in the SDNM are OHV use, recreational target shooting, and nonmotorized activities such as hiking. Growing urban populations surrounding the SDNM are increasing demands for outdoor recreational opportunities on nearby BLM-administered lands, including the SDNM. Increased OHV sales in the study area (DealerNews.com 2015) may also indicate an increased demand for trail-based motorized recreational opportunities within the SDNM. There is also an increasing demand for nonmotorized recreational opportunities, such as hiking, backpacking, and nature photography. Historical visitation levels are included in **Table 3-17**, Visitor Use in the SDNM. Details of planning area recreation are included in **Section 3.3.2**, Recreation Management.

There are currently no data available for SDNM visitor spending patterns, or for BLM-administered lands in the study area. There are, however, visitor spending profiles available for National Forest lands. These spending profiles are provided as an example of public land visitor spending profiles in order to provide a general idea of spending patterns. **Table 3-18**, National Forest Visitor Spending Profiles in 2003, shows spending patterns of these visitors and reflects the portion of spending allocated to different trip components. Recreational target shooters on BLM-administered lands may have similar spending patterns as the typical visitor to a national forest.

Table 3-17
Visitor Use in the SDNM

Year	Visits/Visitor Days
2003	21,738/17,839
2004	18,157/16,500
2005	30,058/37,235
2006	36,852/43,719
2007	31,328/35,775
2008	34,349/42,755
2009	14,304/17,706
2010	17,287/20,340
2011	26,069/30,178
2012	26,835/30,856
2013	26,560/31,000
2014	29,894/32,612
2015	40,310/39,717

Source: BLM 2016b

Table 3-18
National Forest Visitor Spending Profiles in 2003*

Spending Category	Day Trips (nonlocal)	Overnight Trips (nonlocal)	Day Trips (local)	Overnight Trips (local)
Lodging	$0	$47.08	$0	$16.82
Restaurant/Bar	$13.60	$43.98	$6.12	$16.96
Groceries	$7.61	$34.13	$5.41	$33.63
Gas and Oil	$15.99	$36.53	$11.67	$26.95
Other Transportation	$0.98	$5.42	$0.21	$0.58
Activities	$3.87	$12.31	$1.82	$5.06
Admissions/Fees	$5.24	$9.53	$3.42	$9.62
Souvenirs/Other	$4.31	$19.26	$4.19	$11.32
Total Spending	**$51.60**	**$208.23**	**$32.84**	**$120.93**

Source: Stynes and White 2006
*Data is in 2003 dollars, dollar per party per trip.

Recreational Target Shooting

The BLM does not currently have quantitative data which clearly identifies the demand for recreational target shooting opportunities in the SDNM. Anecdotally, however, BLM staff observations indicate that recreational target shooting has increased during the past five years. Due to the lack of specific information about the amount, types, and frequency of recreational target shooting episodes in the SDNM, other available data are used to gain a better idea of these variables. Data from state agencies and recreational target shooting industry groups, related to average spending, state levels of use, and state levels of economic contributions, are provided as a basis for estimating

economic impacts. According to data collected by the AGFD (AGFD 2014), recreational target shooting sports have seen an increase in participation over time. Their study indicated that in 2012, 62 percent of survey respondents indicated they have never shot recreationally; in 2014, that percentage declined to 45 percent. Average shooter days also increased from 12 days in 2012 to 14.1 days in 2014. Approximately 29 percent of shooters exclusively use public ranges, while 46 percent shoot only at private ranges or dispersed recreational target shooting (the BLM's decision-making under this RMPA/EIS is in regards to dispersed recreational target shooting). The remaining 31 percent shoot at a combination of public and private ranges and dispersed recreational target shooting.

During the public scoping period, a number of commenters noted contributions to the local economy from target shooters who use local services, such as hotels and restaurants, specifically hunters who use the area for practice prior to hunting, and campers who incorporate recreational target shooting into their hiking and camping trips to the Monument (BLM 2016c). **Table 3-19**, National Average Spending per Shooter in 2011, shows the national average economic impact per shooter in different spending components. It is likely that spending levels vary for local trips as compared with those visiting from outside the region, as well as for day trips as compared with overnight visits.

Table 3-19
National Average Spending per Shooter in 2011*

Spending Component	Dollars (2013)
Equipment Spending	$406
Trip-Related Spending	$87
Fuel	$48
Food	$24
Lodging	$15

Source: Southwick Associates 2013
*Data is in 2013 dollars.

Social Conditions-Affected Groups and Individuals

The issues being addressed in this RMPA/EIS have a range of impacts that are limited to certain groups and communities of interest. For the purposes of this RMPA/EIS, these groups are defined as recreational target shooters, other recreational users, conservation-minded users, adjacent landowners, and businesses supporting recreational target shooting activities.

Recreational Target Shooters

Recreational target shooters include both local residents and destination visitors from communities outside the planning area who participate in this type of recreation in the SDNM. Shooters use the SDNM for recreational target shooting to practice and sight-in rifles. This group may be most concerned with

changes to opportunities for recreational target shooting. The primary concern that this group might have would be displacement (i.e., having to find other areas, possibly outside the SDNM, to conduct recreational target shooting).

Other Recreational Users

Recreational visitors to the planning area include both local residents and destination visitors from communities outside the planning area. This user group includes OHV users, hikers, backpackers, campers, horseback riders, and wildlife watchers. Concerns this group may have relative to recreational target shooting are impacts on their quality of life, their sense of safety, and the quality and/or quantity of local natural resources. Conservation-Minded Users

Various individuals and groups at the local, regional, and national levels are interested in how the BLM administers lands. They value public lands for open space, wildlife, recreation, and scenic qualities, among other aspects. Concerns this group may have relative to recreational target shooting would be impacts on noise, visual resources, wilderness characteristics, wildlife, and vegetation.

Adjacent Landowners

Neighboring landowners adjacent to public lands are an important group to consider in the planning process. Concerns that this group would have when it comes to recreational target shooting are impacts on their quality of life, their sense of safety, and the quality or quantity of local natural resources. They would also be concerned about any changes to access to public lands that might encourage trespass on their private lands.

Business Interests

Local business owners selling supplies for recreational target shooting as well as those operating private recreational target shooting ranges in the area could be impacted by management decisions regulating recreational target shooting on public lands. Scoping comments were received indicating concerns that additional public recreational target shooting opportunities may impact the private range market. In addition, this group may be concerned with any management that resulted in changes to the level of recreational shooters in the area, as changes in the number of shooters are likely to result in related changes in sales of equipment.

Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, requires that federal agencies identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. Guidance for evaluating environmental justice issues in land use planning is included in the BLM planning handbook, Appendix D (BLM 2005a). Environmental justice refers to the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of

environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies (BLM 2005a). Guidance on environmental justice terminology developed by the President's Council on Environmental Quality (CEQ 1997) provides the following definitions:

- Low-income population. A low-income population is determined based on annual statistical poverty thresholds developed by the US Census Bureau. A low-income community may include either a group of individuals living in geographic proximity to one another or dispersed individuals, such as migrant workers or Native Americans.
- Minority. Minorities are individuals who are members of the following population groups: American Indian, Alaskan Native, Asian, Pacific Islander, Black, or Hispanic.
- Minority population area. A minority population area is so defined if either the aggregate population of all minority groups combined exceeds 50 percent of the total population in the area or if the percentage of the population in the area comprising all minority groups is meaningfully greater than the minority population percentage in the broader region. Like a low-income population, a minority population may include either individuals living in geographic proximity to one another or dispersed individuals.
- Comparison population. For the purpose of identifying a minority population or a low-income population concentration, the comparison population used in this study is the state of Arizona as a whole. A comparison population is one to which the population in the affected area is compared to identify if there are "meaningfully greater" percentages of minority population.

Low-income Populations

In 2014, poverty level is based on total income of $12,071 for an individual and $24,230 for a family of four (US Census Bureau 2014a). As shown in **Table 3-20**, Individuals and Families Living Below Poverty in 2014, poverty data for counties in the socioeconomic study area indicate that the percentage of the individuals and families living below the poverty level for the county region is lower than the comparison population. Pima County is the only county with a slightly higher percentage of individuals living below poverty than the comparison population; however, this difference is less than one percentage point. In addition, as shown in **Table 3-21**, Household Income Distribution in 2014, income data for counties in the socioeconomic study area indicate that the per capita income of the county region is slightly lower than the comparison population. However, median household income is slightly higher than the

Table 3-20
Individuals and Families Living Below Poverty in 2014

	Pima County	Maricopa County	Pinal County	County Region	Arizona
Individuals	184,229	666,748	61,397	912,374	1,169,309
	19.0%	*17.1%*	*16.8%*	*17.5%*	*18.2%*
Families	31,526	118,619	10,406	160,551	209,238
	13.2%	*12.7%*	*11.5%*	*12.7%*	*13.3%*

Source: Headwaters Economics 2016

Table 3-21
Household Income Distribution in 2014*

	Pima County	Maricopa County	Pinal County	County Region	Arizona
Per capita income	$25,524	$27,477	$20,983	$24,661	$25,537
Median household income	$46,233	$53,689	$50,248	$50,057	$49,928

Source: Headwaters Economics 2016
* Data is in 2014 dollars.

comparison population. As a result, no low-income populations have been identified at the county level for further analysis based on CEQ standards. Poverty level was also examined for key communities in the planning area. As shown in **Table 3-22**, Poverty in 2014 for Key Communities, Ajo and Gila Bend both contain low-income populations for further analysis based on CEQ standards.

Table 3-22
Poverty in 2014 for Key Communities

	Ajo	Buckeye	Gila Bend	Goodyear	Maricopa	Phoenix
Individuals in Poverty	1,277	8,029	564	6,049	2,807	341,481
	34.0%	*16.2%*	*28.7%*	*9.2%*	*6.2%*	*23.2%*

Source: US Census Bureau 2014b

Minority Populations

As shown in **Table 3-23**, Population by Race/Ethnicity in 2014, data for counties in the socioeconomic study area indicate that the percentage of the individuals identifying as racial or ethnic minorities for the county region is similar to the comparison population. Therefore, as with poverty and income data, the data does not indicate that there is a minority population at the county level for further environmental impacts analysis based on CEQ standards. Key communities in the planning area as identified in project scoping were also examined for race and ethnicity to determine if minority populations were present at different geographic levels. As shown in **Table 3-24**, Key Community Race/Ethnicity in 2014, Ajo, Gila Bend, and Phoenix all meet CEQ standards for minority populations.

Table 3-23
County-Level Population by Race/Ethnicity in 2014

	Pima County	Maricopa County	Pinal County	County Region	Arizona
Hispanic or Latino of any race	351,329	1,181,100	113,046	1,645,475	1,977,026
	35.4%	*29.9%*	*29.0%*	*30.9%*	*30.1%*
White alone	782,395	3,162,279	309,920	4,254,594	5,174,082
	78.8%	*80.1%*	*79.4%*	*79.8%*	*78.9%*
Black or African American alone	35,426	203,650	18,113	257,189	274,380
	3.6%	*5.2%*	*4.6%*	*4.8%*	*4.2%*
American Indian alone	31,649	74,454	20,698	126,801	290,780
	3.2%	*1.9%*	*5.3%*	*2.4%*	*4.4%*
Asian alone	26,796	144,749	6,616	178,161	191,071
	2.7%	*3.7%*	*1.7%*	*3.3%*	*2.9%*
Native Hawaiian & Other Pacific Islander alone	1,331	8,138	1,658	11,127	12,638
	0.1%	*0.2%*	*0.4%*	*0.2%*	*0.2%*
Some other race alone	80,977	235,737	22,280	338,994	418,033
	8.2%	*6.0%*	*5.7%*	*6.4%*	*6.4%*
Two or more races	34,570	118,375	10,875	163,820	200,532
	3.5%	*3.0%*	*2.8%*	*3.1%*	*3.1%*
Aggregate minority population	**455,418**	**1,666,248**	**163,322**	**2,284,988**	**2,826,663**
	45.9%	***42.2%***	***41.9%***	***42.9%***	***43.1%***
Total Population	**993,144**	**3,947,382**	**390,160**	**5,330,686**	**6,561,516**

Source: Headwaters Economics 2016

Table 3-24
Key Community Race/Ethnicity in 2014

	Ajo	Buckeye	Gila Bend	Goodyear	Maricopa	Phoenix
Hispanic or Latino of any race	1,474	20,638	1,415	19,937	9,602	603,460
	38.9%	*37.6%*	*72.0%*	*28.4%*	*21.2%*	*40.5%*
White alone	2,600	42,680	1,794	55,709	34,476	1,128,800
	68.7%	*77.7%*	*91.3%*	*79.4%*	*76.0%*	*75.7%*
Black or African American alone	48	4,082	18	5,689	4,866	102,055
	1.3%	*7.4%*	*0.9%*	*8.1%*	*10.7%*	*6.8%*
American Indian alone	692	1,031	85	996	865	29,175
	18.3%	*1.9%*	*4.3%*	*1.4%*	*1.9%*	*2.0%*
Asian alone	137	890	9	2,776	1,690	49,929
	3.6%	*1.6%*	*0.5%*	*4.0%*	*3.7%*	*3.3%*
Native Hawaiian & Other Pacific Islander alone	10	143	0	43	36	3,382
	0.3%	*0.3%*	*0%*	*0.1%*	*0.1%*	*0.2%*
Some other race alone	168	4,523	59	2,241	2,042	132,828
	4.4%	*8.2%*	*3.0%*	*3.2%*	*4.5%*	*8.9%*

Table 3-24
Key Community Race/Ethnicity in 2014

	Ajo	Buckeye	Gila Bend	Goodyear	Maricopa	Phoenix
Two or more races	132	1,578	0	2,694	1,413	44,589
	3.5%	*2.9%*	*0%*	*3.8%*	*3.1%*	*3.0%*
Aggregate minority population	**2,236**	**27,172**	**1,527**	**30,720**	**17,970**	**805,380**
	59.0%	***49.5%***	***77.7%***	***43.8%***	***39.6%***	***54.0%***
Total Population	***3,787***	***54,927***	***1,965***	***70,148***	***45,388***	***1,490,758***

Source: US Census Bureau 2014b

Native American Groups

Multiple federally recognized Tribes are present in the study area. These include the Ak-Chin Indian Community, Gila River Indian Community, the Hopi Tribe, Salt River Pima-Maricopa Indian Community, and the Tohono O'odham Nation. Details are included in **Section 3.5.1**, Tribal Interests.

Chapter 4

TABLE OF CONTENTS

Chapter Page

4. ENVIRONMENTAL CONSEQUENCES 4-1

4.1 Introduction 4-1
4.1.1 Analytical Assumptions 4-2
4.1.2 Types of Effects to be Addressed 4-3
4.1.3 Incomplete or Unavailable Information 4-5
4.2 Resources 4-6
4.2.1 Air Quality 4-6
4.2.2 Cultural and Heritage Resources 4-10
4.2.3 Priority Wildlife Species and Habitat 4-19
4.2.4 Soil Resources 4-36
4.2.5 Vegetation 4-44
4.2.6 Water Resources 4-57
4.2.7 Lands with Wilderness Characteristics 4-64
4.2.8 Wildfire Management 4-71
4.3 Resource Uses 4-76
4.3.1 Livestock Grazing 4-76
4.3.2 Recreation Management 4-83
4.3.3 Recreational Target Shooting 4-93
4.3.4 Travel Management 4-97
4.4 Special Designations 4-102
4.4.1 National Conservation Lands 4-102
4.4.2 Congressional Designations 4-103
4.5 Social and Economic 4-120
4.5.1 Tribal Interests 4-120
4.5.2 Hazardous Materials and Public Safety 4-127
4.5.3 Social and Economic Conditions and Environmental Justice 4-131
4.6 Unavoidable Adverse Impacts 4-142
4.7 Irreversible and Irretrievable Commitment of Resources 4-143
4.8 Relationship Between Local Short-term Uses and Long-term Productivity 4-144

TABLES

Page

4-1 Site Density per Alternative 4-16
4-2 Sonoran Desert Tortoise Habitats Available to Recreational Target Shooting by Alternative 4-24
4-3 Acres of Desert Bighorn Sheep Habitat Available to Recreational Target Shooting by Alternative 4-24
4-4 Acres of Mule Deer Habitat Available to Recreational Target Shooting by Alternative 4-25
4-5 Acres of Sonoran Pronghorn 10J Experimental Population Area Available to Recreational Target Shooting by Alternative 4-26
4-6 Acres of Wildlife Movement Corridors Available to Recreational Target Shooting by Alternative 4-27
4-7 Number of Wildlife Water Catchments in Areas Available to Recreational Target Shooting by Alternative 4-28

4-8 Recreational Target Shooting Availability and Sensitive Soils–Alternative A 4-39
4-9 Recreational Target Shooting Availability and Sensitive Soils–Alternative B 4-40
4-10 Recreational Target Shooting Availability and Sensitive Soils–Alternative C 4-41
4-11 Recreational Target Shooting Availability and Sensitive Soils–Alternative D 4-43
4-12 Recreational Target Shooting Availability and Sensitive Soils–Alternative E 4-44
4-13 Vegetation Communities Overlapping Target Shooting Allocations by Alternative 4-49
4-14 Acuña Cactus Critical Habitat Overlapping Target Shooting Allocations by Alternative 4-50
4-15 Recreational Target Shooting Availability and Streams– Alternative A 4-60
4-16 Recreational Target Shooting Availability and Streams– Alternative B 4-61
4-17 Recreational Target Shooting Availability and Streams– Alternative C 4-62
4-18 Recreational Target Shooting Availability and Streams– Alternative D 4-63
4-19 Recreational Target Shooting Availability and Streams– Alternative E 4-64
4-20 Lands Managed to Protect Wilderness Characteristics 4-67
4-21 Lands Found to Possess Wilderness Characteristics 4-67
4-22 Qualitative Intensity Scale – Departure of Vegetation from Reference Conditions 4-72
4-23 Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative A 4-79
4-24 Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative B 4-80
4-25 Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative C 4-81
4-26 Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative D 4-82
4-27 Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative E 4-83
4-28 Sonoran Desert National Monument Objects 4-103
4-29 Economic Impacts of Recreation in Socioeconomic Study Area Counties 4-134
4-30 Average Spending by Activity 4-134

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter presents the likely direct and indirect impacts on the human and natural environment that could occur from implementing the alternatives presented in **Chapter 2**, Alternatives. This chapter is organized by topic, similar to **Chapter 3**, Affected Environment. Each topic area includes a methods of analysis section that identifies indicators, methods, and assumptions; a summary of effects common to all alternatives; and an analysis of impacts for each of the alternatives. Separate sections describing cumulative impacts and irretrievable or irreversible commitment of resources are presented at the end of the chapter.

Many of the allowable uses that comprise the Action Alternatives described in **Chapter 2** are planning-level decisions that would not result in immediate direct and indirect impacts. Some of the impacts would only be apparent later in the 20-year planning horizon.

Some BLM allowable uses may affect only certain resources and alternatives. If an activity or action is not addressed in a given section, no impacts are expected, or the impact is expected to be negligible based on professional judgment.

The BLM administers public lands for multiple uses in accordance with FLPMA. Land use decisions are made to protect the resources while allowing for different uses of those resources, such as energy and mineral development, recreation, and livestock grazing. When there are conflicts among resource uses or when a land use activity could result in unacceptable or irreversible impacts on the environment, the BLM may restrict or prohibit some land uses in specific areas. To ensure that the BLM meets its mandate of multiple use and sustained yield in land management decisions in management of public land, the impacts of the alternatives on resource users are identified and assessed as part of the planning process. The projected impacts on land use activities and the associated

environmental impacts of land uses are characterized and evaluated for each of the alternatives.

Impact analysis is a cause-and-effect process. The detailed impact analyses and conclusions are based on the BLM planning team's knowledge of resources and the project area; reviews of existing literature; and information provided by experts in the BLM, other agencies, interest groups, and concerned citizens. The baseline used for the impact analysis is the current condition or situation, as described in **Chapter 3**. Impacts on resources and resource uses are analyzed and discussed in detail commensurate with resources issues and concerns identified throughout the process. At times, impacts are described using ranges of potential impacts or in qualitative terms.

4.1.1 Analytical Assumptions

Several assumptions were made to facilitate the analysis of the projected impacts. These assumptions set guidelines and provide reasonably foreseeable projected levels of development that would occur within the SDNM during the planning period. These assumptions should not be interpreted as constraining or redefining the allowable uses proposed for each alternative, as described in **Chapter 2**. The following general assumptions apply to all resource categories. Any specific resource assumptions are provided in the methods of analysis section for that resource.

- Implementing actions from any of the RMPA alternatives will be in compliance with all valid existing rights, federal regulations, BLM policies, and other requirements, including the 2012 SDNM ROD and approved RMP
- Implementation-level actions necessary to execute the land use plan-level decisions in this RMPA will be subject to further environmental review, including NEPA, as appropriate
- Direct and indirect impacts of implementing the RMPA will primarily occur in the decision area
- Local climate patterns of historic record and related conditions for plant growth will continue
- Recreational target shooters prefer to travel less than one hour to participate in their activity (Responsive Management 2008a and 2008b; US Institute for Environmental Conflict Resolution 2006)
- Based on field observations by BLM staff, recreational target shooting is heavily dependent on motorized vehicles for access. As a result, very little recreational target shooting and associated impacts occur in wilderness, lands managed to protect wilderness characteristics, and other remote areas far from residential areas and designated routes.

- The term "bullets" is inclusive of all projectiles launched from a firearm
- The discussion of impacts is based on the best available data. Knowledge of the planning area and professional judgment, based on observation and analysis of conditions and responses in similar areas, are used to infer environmental impacts where data are limited.
- Data from geographic information systems (GIS) have been used in developing acreage calculations and for generating many of the figures. Calculations are dependent upon the quality and availability of data, and most calculations in this RMPA are rounded to the nearest 100 acres. Given the scale of the analysis, the compatibility constraints between datasets, and the lack of data for some resources, all calculations are approximate and serve for comparison and analytic purposes only. Likewise, the figures are provided for illustrative purposes and subject to the limitations discussed above. The BLM may receive additional GIS data; therefore, acreages may be recalculated and revised at a later date.

4.1.2 Types of Effects to be Addressed

Potential impacts or effects are described in terms of type, context, duration, and intensity, which are generally defined as follows:

- *Type of Impact*—Because types of impacts can be interpreted differently by different people, this chapter does not differentiate between beneficial and adverse impacts (except in cases where such characterization is required by law, regulation, or policy). The presentation of impacts for key planning issues is intended to provide the BLM decision maker and reader with an understanding of the multiple-use tradeoffs associated with each alternative.
- *Context*—Context describes the area or location (site-specific, local, planning area-wide, or regional) in which the impact would occur. Site-specific impacts would occur at the location of the action, local impacts would occur within the general vicinity of the action area, planning area-wide impacts would affect a greater portion of the SDNM, and regional impacts would extend beyond the planning area boundaries. Unless otherwise stated in the resource section, the spatial boundary for direct and indirect effects is considered to encompass all lands within the SDNM.
- *Duration*—Duration describes the length of time an effect would occur, either short term or long term. Short term is defined as anticipated to begin and end within the first 5 years after the action is implemented. Long term is defined as lasting beyond 5 years to

the end of or beyond the 20-year planning time frame addressed in the RMPA.

- *Intensity*—This analysis categorizes impacts by intensity (e.g., negligible, minor, moderate, and major) using the same scale as in the 2012 RMP:
  - *Negligible:* No known impacts on resources or resource uses. Any change is undetectable and immeasurable. Objects are preserved throughout the SDNM.
  - *Minor:* Direct effects are apparent, measurable, small, localized, and contained within the footprint of the action. Indirect effects are undetectable. Objects are preserved throughout the SDNM.
  - *Moderate:* Direct effects are readily apparent and measurable over a larger area, but are still mainly within the footprint of the action. Indirect effects are apparent and measurable, but do not exceed much beyond the footprint of the action. Objects may be affected on-site and in the vicinity of the activity, but are maintained within the SDNM.
  - *Major:* Direct effects would be highly noticeable and substantial. Indirect effects would be readily apparent and measurable well beyond the footprint of the action. Objects, or some elements of the objects, would be permanently altered on-site, as well as affected over a larger portion of the SDNM.
- *Direct and Indirect Impacts*—Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place. Indirect impacts result from implementing an action or alternative but usually occur later in time or are removed in distance and reasonably certain to occur.
- *Cumulative Impacts*—Cumulative impacts are described in the **Chapter 5**. Cumulative impacts are the direct and indirect effects of a proposed project alternative's incremental impacts when they are added to other past, present, and reasonably foreseeable actions, regardless of who carries out the action (40 CFR, Part 1508.7). The list of actions used for cumulative impact analysis is provided in **Section 5.1.2**, Past, Present, and Reasonably Foreseeable Future Actions.

Impacts are identified as direct or indirect, occurring over the short or long term, and/or localized. Analysis shown under Alternative A may be referenced in the other alternatives with such statements as, "Impacts would be the same as, or substantially similar to, those under Alternative A" or "impacts would be the same as under Alternative A, except for . . ." as applicable.

Irreversible and irretrievable commitment of resources is discussed in **Section 4.7**, Irreversible and Irretrievable Commitment of Resources. Irreversible commitments of resources result from actions in which resources are considered permanently changed. Irretrievable commitments of resources result from actions in which resources are considered permanently lost.

4.1.3 Incomplete or Unavailable Information

The CEQ established implementing regulations for NEPA, requiring that a federal agency identify relevant information that may be incomplete or unavailable for an evaluation of reasonably foreseeable, significant, adverse effects in an EIS (40 CFR, Part 1502.22). If the information is essential to a reasoned choice among alternatives, it must be included or addressed in an EIS. Knowledge and information is, and will always be, incomplete, particularly with infinitely complex ecosystems considered at various scales.

The best available information pertinent to the decisions to be made was used in developing the RMPA. Considerable effort has been taken to acquire and convert resource data into digital format for use in the RMPA, both from the BLM and outside sources.

Certain information was incomplete for use in developing this RMPA/EIS, because inventories are not complete. Some of the major types of data that are incomplete include the following:

- Field inventory of soils and water conditions
- Field inventory of vegetation composition
- Field inventory of wildlife and special status species occurrence and condition
- Field inventories for cultural and paleontological resources
- Field inventory of saguaro cactus forests and saguaro density
- The location and species of plants collected by tribes for seasonal traditional food sources
- Baseline noise measurements

For these resources, estimates were made concerning the number, type, and significance of these resources based on previous surveys and existing knowledge. In addition, some impacts cannot be quantified given the proposed allowable uses. Where this gap occurs, impacts are projected in qualitative terms or, in some instances, are described as unknown. Subsequent project-level analysis would provide the opportunity to collect and examine site-specific inventory data required to determine appropriate application of RMPA-level guidance. In addition, ongoing inventory efforts by the BLM and other agencies in the planning area continue to update and refine information used to implement this RMPA.

4.2 RESOURCES

4.2.1 Air Quality

This section discusses impacts on air quality from proposed alternatives in **Chapter 2**. Existing conditions are described in **Section 3.2.1**, Air Quality.

Methods of Analysis

The impact analysis evaluates the impacts of allowable uses on air quality impact indicators. A qualitative approach was used for analysis of impacts on air quality based on current air quality conditions within the planning area.

The magnitude and extent of air quality effects resulting from recreational target shooting activities proposed in the five alternatives are difficult to quantify due to the wide variability of potential activities in the planning area and the time of occurrence. Indicators of change in concentration of criteria pollutants in a given area are difficult to apply, because they require instruments for monitoring that often are unavailable. Therefore, impacts will be analyzed using qualitative terms.

Indicators of impacts on air quality include the following:

- Volume of traffic on unpaved roads
- Identification of and trends for air quality nonattainment and maintenance areas for NAAQS (based on available state and EPA data)
- Increases or decreases of annual emissions in the SDNM planning area (based on data from the EPA)

The analysis includes the following assumptions:

- Air resource impacts can be localized or regional
- Weather-related events and wildfires may cause or contribute to local or regional air resource impacts

Nature and Type of Effects

For the proposed alternatives, the largest BLM criteria pollutant and emission sources would be associated with motorized travel and surface disturbance. The primary air quality measure affected by recreational target shooting in the SDNM is particulate matter, particularly PM_{10} and $PM_{2.5}$. Most vehicle routes used to access recreational target shooting areas are unpaved, which would result in a short-term increase in particulate emissions, or fugitive dust, which can affect local air quality, especially in areas of concentrated travel on unpaved roads and during periods of high winds.

Emissions from motorized travel to the SDNM to access recreational target shooting areas would also impact air quality and could increase concentrations

of criteria pollutants in nonattainment areas. Maricopa County contains some areas that are designated as nonattainment for PM_{10}, CO, and O_3 (EPA 2015). Pinal County also contains nonattainment areas for SO_2, CO and O_3. These nonattainment areas are shown on **Figure 3-1**, Air Pollutant Nonattainment Areas. Emissions resulting from travel to recreational target shooting areas and travel on unpaved roads contribute to these concentrations.

Effects Common to All Alternatives

Under all alternatives, the BLM would implement monitoring strategies, which would reduce the potential for impacts on air quality as described in the *Nature and Type of Effects*.

For Alternatives A through D, the BLM would implement monitoring and mitigation reduce impacts on air quality based on monitoring results. Examples of mitigation measures include temporarily restricting areas available for recreational target shooting or allowing recreational target shooting to continue while mitigating impacts. Restrictions may include limits and closures on use of dirt roads and changes in operating procedures for all surface-disturbing activities in areas not meeting air quality standards. Implementing these strategies would reduce the potential for impacts on air quality by increasing awareness and oversight of the issue or by focusing use in areas more suitable for recreational target shooting while maintaining or improving resource values to maintain or improve air quality. Mitigation that results in temporary or permanent restrictions on recreational target shooting would be expected to result in short-term and long-term reductions, respectively, in impacts on air quality associated with recreational target shooting.

Under Alternatives A through D, having areas available to recreational target shooting can increase the chance of human-caused wildfire ignition; depending on the size of the fire, this may cause minor to major short-term declines in air quality from particulate emissions and smoke. Smoke from wildfires contain large quantities of CO_2, as well as criteria pollutants, hazardous air pollutants, CH_4, and NO_2.

Under Alternative E, monitoring would help ensure the proposed restriction of the SDNM to recreational target shooting would be enforced and the potential for impacts on air quality, such as increases in particulate matter and vehicle emissions from recreational target shooting, would be reduced as visitors seeking recreational target shooting experiences would move to areas outside of the SDNM.

Alternative A

Under Alternative A, recreational target shooting would continue to occur within the SDNM, resulting in the greatest potential for increases in motorized vehicle emissions and fugitive dust described in the *Nature and Type of Effects*.

The northern portion of the SDNM is affected by the automobile emissions CO, CO_2, SO_2, and PM_{10}. Recreational target shooting is dispersed throughout the SDNM; however, the activity is concentrated at locations next to its northern boundary along the El Paso Natural Gas Company pipeline road and smaller sites next to SR 238 and Vekol Valley Road. These areas may experience more localized impacts on air quality from fugitive dust and emissions as a result of concentrated activity.

Under Alternative A, ground-disturbing activities resulting from vehicle and OHV travel to recreational target shooting areas would have moderate direct, site-specific impacts on air quality by increasing levels of particulate matter (fugitive dust) in the short term.

Under Alternative A, all roads in the SDNM would remain available to for recreational target shooting access, since no areas are restricted under this alternative. Therefore, the potential for impacts on air quality, including direct, site-specific impacts from motorized travel and indirect impacts from recreational target shooting-caused fires as described under the *Nature and Type of Effects*, would be highest under this alternative. Some of the existing roads and trails that are available for motorized use would be within PM_{10} nonattainment areas. Continued use of these routes would result in an increase in PM_{10} emissions if the amount of OHV travel increased over current conditions with population increases or if the miles of routes increased through user creation of new routes. Impacts would range from moderate to major depending on use levels.

Managing the entire decision area would be available for recreational target shooting under Alternative A may increase the likelihood that the BLM would have to implement mitigation measures. Applying mitigation measures that do not restrict an area to recreational target shooting would result in moderate, site-specific impacts on air quality. Mitigation measures that restrict recreational target shooting temporarily or permanently would result in minor, site-specific impacts on air quality.

Alternative B

Under Alternative B, the number of acres available for recreational target shooting in the decision area would be reduced by 10,100 acres relative to Alternative A. As a result, ground-disturbing activities that directly impact local air quality from vehicles and OHVs traveling to recreational target shooting areas would likely be reduced by at least 2 percent, relative to Alternative A, as the restriction would eliminate recreational target shooting opportunities in an area popular for them. These impacts are described in *Nature and Type of Effects* and the magnitude of impacts would be minor to moderate, depending on the amount of vehicle use that is displaced to areas outside the SDNM.

Because 2 percent of the decision area where use is concentrated would be restricted from recreational target shooting, the amount of recreational target

shooting would be similar to the amount under Alternative A, resulting in the same potential need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a slightly smaller area under Alternative B.

Alternative C

Under Alternative C, areas in the decision area available for recreational target shooting would be reduced by approximately 52,800 acres relative to Alternative A. As a result, ground-disturbing activities that directly impact local air quality from vehicle and OHV travel to recreational target shooting areas would be reduced by approximately 11 percent relative to Alternative A. These impacts are described in *Nature and Type of Effects* and the magnitude of impacts would be minor to moderate, depending on the amount of vehicle use that is displaced to areas outside the SDNM.

Because 89 percent of the decision area would be available for recreational target shooting, there would likely be less recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative C.

Alternative D

Under Alternative D, areas in the decision area available for recreational target shooting would be reduced relative to Alternative A by approximately 319,900 acres. Impacts from associated vehicle use would only be reduced in the 108,100 acres of lands managed to protect wilderness characteristics. In the 159,100 acres of designated wilderness, impacts from associated vehicle use would be the same as described under Alternative A because motorized vehicles are not allowed in wilderness areas. As a result, ground-disturbing activities that directly impact local air quality from vehicle and OHV travel to recreational target shooting areas would be reduced by 22 percent compared with Alternative A, a minor reduction. These impacts are described in *Nature and Type of Effects*.

Because 34 percent of the decision area would be available for recreational target shooting, there would likely be less recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative D.

Alternative E

Under Alternative E, recreational target shooting would be restricted in the entire SDNM. Compared with Alternative A, Alternative E would result in no impacts on air quality from recreational target shooting in the SDNM, as described under the *Nature and Type of Effects*.

Since the entire SDNM would be restricted to recreational target shooting, the BLM would not likely need to implement mitigation measures. Impacts from monitoring under Alternative E are described under *Effects Common to All Alternatives*.

4.2.2 Cultural and Heritage Resources

As described in **Section 3.2.2**, cultural and heritage resources are past and present expressions of human culture and history in the physical environment. These can include archaeological, historic, and architectural sites, structures, or places with important public and scientific uses. They also may include locations of traditional cultural or religious importance to specific social or cultural groups. Cultural resources that are important to Native American tribes as part of their heritage are addressed in **Section 4.5.1**. This section discusses the potential impacts on cultural and heritage resources from the restrictions and availability of lands for recreational target shooting under each of the alternatives described in **Chapter 2**, Alternatives. Cultural resource impacts primarily concern the destruction of nonrenewable resources and their context and the loss of information and cultural meaning associated with these resources.

Methods of Analysis

The BLM is mandated to identify, evaluate, and manage cultural resources in accordance with federal laws, regulations, and other authorities, including the NHPA of 1966, as amended, and NEPA. The implementing regulations for Section 106 found at 36 CFR, Part 800 describe the process for identifying and evaluating the significance of historic properties, for assessing the effects of federal actions on historic properties, and for consulting to avoid, minimize, or mitigate adverse effects. Historic properties meet specific significance criteria that would make them eligible for listing on the NRHP.

The quality of significance in American history and archaeology is present in districts, sites, buildings, structures, and objects that retain integrity of location, design, setting, materials, workmanship, feeling, and association, and that are associated with events that have made a significant contribution to the broad patterns of our history; or associated with the lives of persons significant in our past; or that embody distinctive characteristic of a type, period, or method of construction, or that represent the work of a master; or that have yielded information important in prehistory or history.

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion on the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Actions that protect, limit, or otherwise avoid impacts on the integrity of the historic property would help protect and maintain the characteristics that contribute to NRHP eligibility.

As described in **Section 3.2.2**, the BLM allocates cultural resources to various use categories as a management strategy.

Protections for cultural resources are part of the Presidential Proclamation 7397, which designated the SDNM. The purpose of the SDNM designation is to protect and manage the SDNM's natural, geologic, and cultural resources for long-term conservation, and to further our knowledge and understanding of such resources through scientific research and interpretation. The SDNM is described as a "cultural landscape that appears largely unchanged, with a rich history that spans at least 10,000 years, from the Archaic to modern day." Specific protection criteria include reducing threats and resolving conflicts from natural and human-caused degradation affecting the integrity of sites and settlement clusters, site condition context, setting, stability, and capacity to yield scientific information. Criteria for the Juan Bautista de Anza NHT include reducing threats related to the historic trail corridor, its setting, and loss of interpretative opportunities. The Juan Bautista de Anza NHT is a significant resource and is subject to the NPS's CMP, which has additional management goals addressing protection for trail segments, archaeological sites, ethnographic resources, adjacent properties, research, and interpretation (NPS 1996). The Mormon Battalion Trail and the Butterfield Overland Stage Route are also important trail resources within the SDNM.

In the SDNM, the most common cultural resources are archaeological sites. An archaeological site maintains integrity when its elements or attributes remain in place as originally deposited. The number of sites that could be affected by actions correlates with the degree, nature, depth, and quantity of potential or proposed surface disturbance, along with the cultural sensitivity of the area. For other types of cultural resources, such as the Juan Bautista de Anza NHT or Native American religious uses, intrusions on the integrity of the setting could be an important impact concern. Indirect impacts would be those that would result from implementing the planning decisions at a later time or be further removed such as through noise, visual intrusions, access or erosion.

Indicators of impacts on cultural and heritage resources through loss of integrity include the following:

- The extent of surface-disturbing activities or other direct disturbances that may occur, such as through mixing and breakage of surface artifacts and features, and their potential for affecting the physical integrity of known or potential historic properties
- The extent of access, use, or activity in areas where historic properties and cultural practices may be present or anticipated, resulting in vandalism, unauthorized collection, inadvertent damage, or alteration to settings and experience

- The extent to which an action changes the potential for erosion or other natural processes that could affect historic properties or areas of importance to Native American or other communities
- The extent to which an action reduces the availability of cultural resources for appropriate uses, including access to Native American spiritual sites or traditional resource gathering areas
- The extent to which an action preserves or changes the setting (such as visual and audible factors) of historic properties where it is relevant to certain cultural resources and maintaining the integrity of setting

Specific methods used to describe the potential or risk of impacts include the following for each alternative:

- A summary of the types of cultural resources present in areas proposed as restricted or available to recreational target shooting
- A qualitative assessment of potential impacts based on a review of the alternatives against the impact indicators and compared with Alternative A, the No Action Alternative

The analysis includes the following assumptions:

- Cultural resources are nonrenewable resources and, thus, impacts are permanent. Impacts on nonrenewable resources are irretrievable and irreversible. Therefore, they receive less benefit from a monitoring and mitigation framework. Impacts can vary in intensity and can range up to a complete loss of the resource. Impacts can occur as a result of a single incident or as a result of incremental actions.
- The BLM would continue to comply with 36 CFR, Part 800, Section 106 (including Native American consultation) when addressing actions that are federal undertakings; therefore, the BLM will take into account adverse effects on historic properties for its actions and activities
- Baseline information on cultural resources in the SDNM is limited to previously recorded resources and past inventories covering approximately 6 percent of the SDNM. These data are geographically biased toward past project-oriented undertakings and cannot accurately predict where and how many resources may exist in unsurveyed areas. Future cultural resource inventories, either federal undertakings or related programs, would continue to identify a broad range of cultural resources.

- Because of limited survey and evaluations, for this analysis all cultural resources that are unrecorded or unevaluated should be treated as eligible for inclusion in the NRHP
- There is potential for unrecorded cultural resources to be present throughout the SDNM, but there is a higher probability of these resources in areas associated with water sources, lithic sources, bajadas, and prehistoric and historic transportation corridors
- Native Americans or other traditional communities may have concerns about the impacts of federal actions on cultural resources, access for religious ceremonies, values and qualities of the places where religious ceremonies are held, or natural resource gathering that may be unknown outside of those communities. Consultation would continue to occur with the potentially affected group or groups to determine the presence or absence of these resources, their importance, and other values or tribal interests that may be considered when determining impacts. Cultural resources that are important to Native American tribes as part of their heritage are addressed in **Section 4.5.1**.
- Degradation of known and undiscovered cultural resources from natural processes (e.g., erosion) would continue regardless of avoidance of human-caused impacts. Human visitation, recreation, vehicle use, trampling, and other activities can increase the rate of deterioration through natural processes.
- Recreational users usually do not drive more than one hour to reach a recreational target shooting locale. Recreational target shooting is dispersed throughout the SDNM; however, the activity is concentrated at locations next to its northern boundary along the El Paso Natural Gas Company pipeline road and smaller sites next to State Road 238 and Vekol Valley Road.
- Recreational target shooting is an activity that is highly dependent on vehicle routes. Recreationalists rarely hike into areas where there are no roads with their firearms, ammunitions, and target materials. The recreational target shooting areas observed in SDNM are typically found in proximity to vehicle routes, so use and potential impacts on cultural resources are likely to be concentrated in these areas.

Nature and Type of Effects

Impacts on historic properties are difficult to quantify. The locations and significance of most cultural resources within the SDNM have not been determined or cannot be specified. Likewise, the specific locations of recreational target shooting activities cannot be determined at a planning scale. Impacts associated with certain alternatives can be best described as increasing the risk or likelihood of an adverse effect under Section 106 of the NHPA, 54

USC, Section 306108. By extension, those activities that would increase the risk or likelihood of adverse effects may be inconsistent or incompatible with existing management plans, and cultural resource preservation of Monument objects defined in the Presidential Proclamation 7397 designating the SDNM.

Recreational target shooting involves surface disturbance through vehicle use, trampling, loss of ground cover, and erosion. Any activities that would involve surface-disturbing activities could have direct and indirect impacts on historic properties and other undiscovered or unevaluated cultural resources. These could include damaging, destroying, or displacing artifacts and features and introducing solid waste or hazardous materials that are out of character with historic settings or traditional cultural uses. Damaging, displacing, or destroying historic properties could impact resource integrity by removing artifacts from their archaeological context, breaking artifacts, or shifting or excavating features without appropriate scientific recording. Related deposits of organic material in soils and paleo-environmental data from the analysis of packrat middens can also be lost through surface disturbance. Locations of natural resources, such as plants or minerals that may be used traditionally, may also be damaged through surface disturbance.

Direct impacts could occur from recreational target shooting in the vicinity of rock art or structures from intentional or inadvertent bullet strikes and ricochet. Impacts from recreational access can include other forms of disturbance, such as unauthorized collection, illegal dumping of solid waste, or inadvertent damage to site features. Recreational activities often cause changes in the archaeological context from clearing and moving materials to create targets or fire rings.

Indirect impacts on historic properties could include those that change the character of a property's use or physical features in a property's setting that contribute to its historic significance. Ongoing use of areas could exacerbate impacts due to erosion of fragile soils and incremental expansion of disturbed areas. Recreational target shooting generates noise and activities that could introduce visual, atmospheric, or audible elements that could diminish the integrity of the setting and the feeling of historic properties, and the Juan Bautista de Anza NHT, or may interfere and intrude on Native American traditional and religious uses.

Effects Common to All Alternatives

Under all alternatives, cultural resources and objects of the SDNM with cultural value would continue to be affected by natural weathering and erosion processes. Ongoing and proposed human uses may also degrade the integrity of cultural resources and areas. Quantifying impacts on cultural resources is difficult because of limited cultural resource inventories within the SDNM and limited knowledge of Native American traditional cultural properties, sacred sites, or use areas within the SDNM. However, archaic hunting camps,

prehistoric procurement sites, lithic scatters, ceramic scatters, Hohokam occupational sites, petroglyph sites, historic artifact scatters, historic artifact scatters with features or structures, can be impacted by recreational target shooting and vehicle use. Artifacts can be displaced and crushed, which compromises the integrity of location and materials. Walls, structures, and features can be shot directly or by ricochet which would compromise materials, design, and workmanship. The degree to which integrity is compromised can ultimately affect whether or not a site would continue to convey its significance to the NRHP, or in some cases the traditional cultural values ascribed by a Native American tribe or another ethnic group. While quantifying impacts is difficult, the greater the acreage and access for recreational target shooting, the greater the potential for impacts on cultural resources.

Cultural resources are non-renewable resources, and impacts are irreversible and irretrievable. Potential impacts from recreational target shooting depend on acres available for recreational target shooting. The smaller the area, the lesser the potential impacts. The greater the area, the greater the potential impacts. Monitoring may mitigate or minimize future impacts from occurring, but impacts noted by monitoring have already occurred. Mitigation measures addressing other resource values that result in temporary or permanent restrictions on recreational target shooting may provide incidental protections for cultural resources. Monitoring under Alternative E would determine the effectiveness of the restrictions on all recreational target shooting and protect cultural resources from impacts due to this activity within the SDNM.

Cultural resource compliance actions would continue under all alternatives. Laws, regulations, and BLM policies would apply to implementation of any mitigation measures that would be considered federal undertakings. Compliance with Section 106 of the NHPA would result in the continued identification and evaluation of sites and other cultural resources within the SDNM. Potential adverse effects on historic properties would be avoided, minimized, or mitigated per Section 106 of the NHPA.

The BLM is developing a compliance document that will address issues related to Section 106 consultation. Specifically, the compliance document will include Class I documentation of previously performed cultural resources surveys and a list of known, recorded sites; results of additional field surveys that will verify the presence or absence of cultural sites in or near some of the most heavily used target shooting sites on the SDNM; and a commitment to continue to work with Native American tribes to identify sacred areas, ceremonial areas, and/or areas where certain plants are gathered, especially those areas near target shooting sites. This information will be used to compile a finding of effect, which will also be included in the compliance document. Monitoring and mitigation, as outlined in Appendix B, would include continued implementation of avoidance measures to prevent impacts on cultural resources.

Alternative A

Under Alternative A, all areas in the decision area would remain available for recreational target shooting. Although recreational target shooting has generally been concentrated in particular areas, this alternative would continue to make the most land available for this activity (486,400 acres). Only 6 percent of the SDNM has been surveyed for cultural resources, and 291 archaeological sites and other resources have been recorded. Site density is estimated at 6.3 sites per square mile, which translates to a projected 4,800 sites within the SDNM. Thus, more land is available for this dispersed recreational activity in the SDNM, which has high site density and a high percentage of uninventoried acres. This would correspond with most potential for the risk of impacts on historic properties and related objects in the SDNM as described in the *Nature and Type of Effects*. Table 4-1, below, shows the potential site density across the alternatives. This analysis does not assume that site distribution is actually uniform across the Monument. The table simply illustrates that the Monument has been sampled in a limited fashion, and the potential for unrecorded resources is substantial.

Table 4-1
Site Density per Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Acres Available	486,400	476,300	433,600	166,500	0
Square Miles	760	744	677	260	0
Potential Sites	4,788	4,688	4,268	1,638*	0

Alternative A does not provide additional protections to historic properties and uninventoried or unevaluated cultural resources through restriction to any areas including sensitive resources and Monument objects such as the Vekol Wash, the Juan Bautista de Anza NHT, the Mormon Battalion Trail, and the Butterfield Overland Stage Route. Noise and potential resource damage associated with recreational target shooting throughout the SDNM would be inconsistent with resolving threats and conflicts from natural and human-caused degradation on the integrity of historic properties and uninventoried or unevaluated cultural resources in the SDNM.

The impacts of dispersed recreational target shooting are difficult to monitor and mitigate when site locations are unknown and the activity is available throughout the SDNM. However, monitoring and mitigation under Alternative A would likely prioritize areas where this activity has historically occurred and where SDNM personnel could identify and reduce the potential for impacts in these areas. Based on assumptions that recreational target shooting would be concentrated near roads, resource impacts may be limited in areas where vehicle access is not available or beyond the edges of the wilderness areas. Specific consideration of cultural resources in the approved SDNM travel

management plan have led to access controls that may limit recreational target shooting in areas with known cultural resources due to limited vehicle access.

Since the entire decision area would be available for recreational target shooting under Alternative A, there would be a high likelihood that the BLM would need to implement mitigation measures. Applying mitigation measures that do not restrict overall recreational target shooting would reduce the potential for impacts locally if implemented to protect areas with known, or high potential for historic properties. Mitigation measures that broadly restrict recreational target shooting temporarily or permanently would result in a reduced risk of impacts on historic properties in those areas.

Alternative B

Under Alternative B, areas in the SDNM available for recreational target shooting would be reduced by 10,100 acres relative to Alternative A. Restricted areas under Alternative B include the El Paso Natural Gas Company pipeline road, which has been a popular area for concentrated recreational target shooting use in the past. The State Road 238 corridor and Vekol Valley Road would remain available for recreational target shooting. Although there would be fewer acres available to this activity, the proposed restricted area has been previously disturbed by recreational target shooting. Alternative B does not provide additional protections to uninventoried and unevaluated cultural resources, historic properties or Monument objects, such as the Vekol Wash, the Juan Bautista de Anza NHT, the Mormon Battalion Trail, and the Butterfield Overland Stage Route.

The potential for impacts under Alternative B would be similar to those under Alternative A throughout most of the SDNM. However, restrictions on recreational target shooting in this area may displace this activity to other areas with road access, such as the nearby Juan Bautista de Anza NHT RMZ or to other areas where the risk of impacts on the integrity of historic properties and uninventoried or unevaluated cultural resources may increase. The Juan Bautista de Anza NHT RMZ is already heavily used for recreational activities by the recreating public. Trail resources and associated site and landscape setting are considered Monument objects. Recreational target shooting, use, and access would continue to increase the risk of impacts from surface disturbance, bullet strikes, vandalism, unauthorized collection, interference with tribal cultural uses, loss of interpretive opportunities, and the introduction of visual, atmospheric, or audible elements that could diminish the integrity of the setting and the feeling of cultural resources or to associated historic properties.

Although there would be fewer acres available for this activity, the proposed restricted area has been previously disturbed by recreational target shooting. This restriction may lead to less recreational target shooting within the SDNM, resulting in less need to implement mitigation measures. However, these activities may be displaced to other parts of the SDNM that have high

concentrations of intact and sensitive historic properties, tribal-use areas, and cultural resources, along with areas with important interpretive opportunities. Applying mitigation measures that do not restrict recreational target shooting outside of the 10,100-acre area identified under Alternative B would reduce the potential for impacts locally if implemented to protect areas with known, or high potential for, historic properties. Impacts after applying other broader mitigation measures would be similar to those described for Alternative A, but they would likely affect a smaller area under Alternative B.

Alternative C

Under Alternative C, areas in the decision area available for recreational target shooting would be reduced by approximately 52,800 acres by restricting this activity within the Juan Bautista de Anza NHT RMZ. The RMZ contains historic properties, cultural resources and Monument objects such as the Juan Bautista de Anza NHT, the Mormon Battalion Trail, and the Butterfield Overland Stage Route. This area has two petroglyph sites within its boundaries. The NHT also has additional management goals outlined in NPS's CMP addressing protection for trail segments, archaeological sites, ethnographic resources, adjacent properties, research, and interpretation (NPS 1996). These restrictions would be consistent with protection criteria for Monument objects and CMP management goals for the Juan Bautista de Anza NHT.

Alternative C would provide additional protections and reduce the risks of impacts on historic properties, cultural resources and associated settings over Alternative A. Restricting recreational target shooting in the Juan Bautista de Anza NHT RMZ could displace this activity to other areas of the SDNM such as the Desert Back Country RMZ or the El Paso Natural Gas Company pipeline road, or to locations off of the SDNM. The potential for impacts on cultural resources in the SDNM would be reduced overall, but potential impacts in available areas would be similar to those under Alternative A.

Because 433,600 acres of the decision area would be available for recreational target shooting, there would likely be less recreational target shooting than under Alternative A, and none within the Juan Bautista de Anza NHT RMZ, resulting in less need to implement mitigation measures. Further, applying mitigation measures that do not restrict recreational target shooting outside of the Juan Bautista de Anza NHT RMZ would reduce the potential for impacts locally if implemented to protect other areas with known, or high potential for, historic properties. Impacts after applying other broader mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative C.

Alternative D

Under Alternative D, recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ, three designated wilderness units, and all lands managed to protect wilderness characteristics, totaling approximately

320,050 acres. This includes approximately 52,800 acres in the Juan Bautista de Anza NHT RMZ, approximately 159,096 acres of designated wilderness, and approximately 108,100 acres of area managed for wilderness character within the decision area. Areas designated as wilderness or with wilderness character are not currently popular for recreational target shooting because of the lack of motorized vehicle access, and as a result, these areas may have a higher percentage of undisturbed cultural resources and intact settings.

Alternative D would provide additional protections and reduce the risks of impacts on historic properties, cultural resources, and associated settings over Alternative A. Among the restricted areas to recreational target shooting, culturally sensitive areas and Monument objects south of I-8 in the Table Top Wilderness and other locations throughout the SDNM would be included. Restrictions on recreational target shooting would be concentrated in the areas described above; potential impacts in the approximately 166,500 acres available to recreational shooting would be similar to those under Alternative A.

Because 66 percent of the decision area would be restricted for recreational target shooting, there would likely be less overall recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Further, applying mitigation measures that do not restrict recreational target shooting outside of these areas would reduce the potential for impacts locally if implemented to protect other areas with known, or high potential for, historic properties. Impacts after applying other broader mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative D.

Alternative E

Under Alternative E, recreational target shooting would not be available in the SDNM. This would eliminate potential impacts on cultural resources from this as an authorized activity. Recreational target shooting would likely continue in areas outside of the SDNM. Under Alternative E, monitoring would help ensure that the proposed restriction of recreational target shooting in the SDNM would be enforced. Since the entire SDNM would be restricted to recreational target shooting, the BLM would not likely need to implement mitigation measures. Impacts from monitoring under Alternative E are described under *Effects Common to All Alternatives*.

4.2.3 Priority Wildlife Species and Habitat

This section discusses impacts on priority wildlife species and habitat from proposed alternatives in **Chapter 2**. Existing conditions are described in **Section 3.2.4**, Priority Wildlife Species and Habitat.

This analysis focuses on impacts on Sonoran desert tortoise, desert bighorn sheep, mule deer, and raptors. These key priority species and their habitat needs are representative of the vegetation communities and habitat components of the other priority wildlife species in the SDNM (other priority species are

identified in **Section 3.2.4**). Any impacts on other priority species not covered under the key priority species are discussed under *Other Priority Wildlife Species and Habitat*. In addition, impacts on wildlife movement corridors and water catchments are also analyzed.

Methods of Analysis

Indicators of impacts on priority wildlife species and habitat include the following:

- Disturbance and/or loss of plant communities, food supplies, cover, breeding sites, and other wildlife habitat components necessary for ecosystem function
- Wildlife mortality
- Changes in wildlife use of habitat or other changes in wildlife behavior

The analysis includes the following assumptions:

- Disturbance to a key or critical component of a species habitat will be detrimental, with the degree of detriment dependent on the importance of the habitat component to the maintenance of the population
- Habitat conditions and quality are directly linked to the health, vigor, and cover of vegetative communities
- Impacts on wildlife from displacement depend on the location, extent, timing, or intensity of the disruptive activity. Furthermore, impacts from displacement will be greater for wildlife species that have limited habitat or a low tolerance for disturbance.
- In the context of this analysis, the term "avoidance" means reduced use and does not imply a complete absence of use by wildlife
- Direct, indirect, and cumulative impacts on key species will be evaluated as a surrogate for other wildlife in the decision area. These key species include Sonoran desert tortoise, desert bighorn sheep, mule deer, and raptors.
- Recreational target shooting will share common impacts on wildlife resources with other forms of recreation (e.g., driving to access recreational shooting locations can contribute to wildlife collision mortality). Common impacts shared with other forms of recreation as analyzed in the 2012 SDNM RMP and ROD remain valid but are not further discussed in this impact analysis.

Nature and Type of Effects

Recreational target shooting may result in reduced vegetation, cover, and/or food sources for wildlife. For example, bullets that strike saguaros may result in

the long-term reduction in wildlife cover and food sources, as saguaros are slow to mature and experience infrequent peaks in regeneration (Pierson et al 2013). Recreationists could also introduce nonnative grasses via their vehicles, clothing, or OHV use, and spread of these grasses could degrade wildlife habitats over the long term (Meyer 2008).

Recreational target shooting in areas of frequent use may also affect wildlife through habitat avoidance or other behavioral changes caused by human presence or noise from recreational target shooting over the long term (Knight and Cole 1995). Noise caused by humans can have a variety of behavioral and physiological effects on wildlife, including increased heart rate, changes in metabolism and hormone balance, increased energy expenditure, reduced food intake, habitat avoidance and abandonment, and reduced reproductive success (Radle 2007; Barber et al. 2009). Human disturbance near raptor nests can result in the abandonment of the nest; high nestling mortality from overheating, chilling, or dehydration when young are left unattended if adults are flushed from the nest; premature fledging; and reduced access to resources (Gutzwiller et al. 1998).

Desert bighorn sheep are also highly sensitive to human presence, particularly if they approach with a dog or from over a ridge. Research has found that human disturbance can alter habitat use and activity patterns, and interrupt seasonal migration routes (BLM 2001; Lowrey 2007). Human presence has been shown to cause elevated heart rates and elicits a flight response by bighorn sheep. Flight responses may be higher for ewes with young lambs (BLM 2001). Further, travel corridors between lambing areas and watering areas are important, and human presence may disrupt access to important resources (BLM 2001; Schoenecker and Krausman 2002). Mule deer are less sensitive to human presence, and population level impacts are unlikely, though human development generally reduces mule deer use of an area (Innes 2013; Heffelfinger et al. 2006).

Nesting raptors may also be disturbed by human presence and noise (Martinez-Abrain et al. 2010). Researchers have found impacts from temporary noise increases on other types of birds, such as songbirds, including a reduction in breeding pairs, increased desertion of nests, and reduced hatchling success and nestling survival (Korschgen and Dahlgren 1992; Westmoreland and Best 1985). Impacts would occur over the long term.

Use of lead bullets in recreational target shooting may result in indirect impacts on wildlife (particularly ground foraging animals, predators, and scavengers) in areas of heavy use, through bioaccumulation resulting from ingestion of bullet fragments. Resulting impacts include illness and/or mortality (Haig et al. 2014).

Further, garbage and debris left by recreational target shooters could attract predators, such as scavenging raptors or coyotes. This could indirectly cause increased mortality to species such as desert tortoise, small mammals, and reptiles due to increased predation.

Impacts on wildlife resources from recreational target shooting would continue to be concentrated along the El Paso Natural Gas Company pipeline road, the SR 238 corridor, and the Vekol Valley Road.

Seasonal restrictions for BLM routes 8013, 8018, and 8019 would reduce the amount of wildlife habitat open to recreational target shooting between April 15 and August 31. This could potentially reduce the impact on wildlife species during the hot summer months.

Effects Common to All Alternatives

Sonoran Desert Tortoise
There would be no effects common to all alternatives for Sonoran desert tortoise because effects are related to the number of acres available for recreational target shooting, which vary by alternative.

Desert Bighorn Sheep
Under all alternatives, recreational target shooting would likely have a negligible impact on the degradation of vegetation within desert bighorn sheep habitat, as their preferred habitat is rocky and steep. These areas are less desirable places for recreational target shooting and, thus, are unlikely to be impacted. However, recreational target shooting has the potential to directly and indirectly affect dispersal through avoidance of wildlife movement corridors in lowland areas subject to recreational target shooting. Such avoidance could have a long-term indirect effect on population and genetics. These effects are possible to varying degree (e.g. less for raptors and mule deer and greater for Sonoran pronghorn and bighorn sheep) with each of the priority wildlife species.

Mule Deer
There would be no effects common to all alternatives for mule deer because effects are related to the number of acres available for recreational target shooting, which vary by alternative.

Raptors
There would be no effects common to all alternatives for raptors because effects are related to the number of acres available for recreational target shooting, which vary by alternative.

Other Priority Wildlife Species and Habitat
Because recreational target shooting would generally occur away from bat maternity roost sites (or would be restricted as under Alternative E), and shooting typically occurs during the day, impacts on bats would be negligible.

Because there is no riparian habitat in the planning area, there are no riparian obligate species. Therefore, under all alternatives, there would be negligible impacts on riparian obligate wildlife species.

Because there is a low density of hunters and game species in the planning area, impacts associated with bioaccumulation of lead would be negligible.

Wildlife Movement Corridors and Water Catchments
Management actions in the approved SDNM RMP 2012 that guide the management of movement corridors and water catchments would be implemented under all alternatives.

Monitoring and Mitigation
Mitigation measures would be implemented under all alternatives. These would reduce the impacts on priority wildlife species and habitats described under the *Nature and Type of Effects* to varying degrees. Applying mitigation measures that do not restrict an area to recreational target shooting would reduce the potential for wildlife mortality and loss of important habitat components (compared to if no mitigation measures were applied) primarily through increased education, regulatory signing, and law enforcement presence. Mitigation measures that restrict recreational target shooting temporarily or permanently would further limit the potential for disturbance, wildlife mortality, and changes in wildlife use over the long term. The extent of impacts would vary based on the amount of land where discretionary restrictions would be applied.

Under Alternative E, monitoring would help ensure the proposed restriction of the SDNM to recreational target shooting would be enforced and the potential for disturbance impacts, wildlife mortality, and changes in wildlife use would be reduced as visitors seeking recreational target shooting experiences would move to areas outside of the SDNM.

Alternative A

Sonoran Desert Tortoise
The acres of desert tortoise habitat that would be available to recreational target shooting under each alternative are presented in **Table 4-2**. Since the entire SDNM would be available to recreational target shooting under Alternative A, all desert tortoise habitat in the SDNM could continue to be potentially affected over the long term through impacts such as reduced cover and forage, as described under the *Nature and Type of Effects*. Direct impacts on desert tortoise habitat are expected to be moderate.

Indirect impacts on desert tortoise individuals are expected to be moderate.

Tortoises could also be disturbed by human presence, causing a change in their behavior. In winter, human noise and presence could disrupt desert tortoise hibernation, having subsequent impacts on survival of affected individuals (Meyer 2008). Also, when handled or disturbed, the Sonoran desert tortoise may release the contents of its bladder, which can deplete its water supply and cause harm or death, particularly during times of drought. These indirect impacts are expected to be minor.

Table 4-2
Sonoran Desert Tortoise Habitats Available to Recreational Target Shooting by Alternative

Habitat Category	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Category I	165,900	159,700	143,300	27,900	0
Category II	124,700	124,100	117,700	22,100	0
Category III	3,500	3,500	3,500	3,200	0

Source: BLM GIS 2016

Both direct and indirect impacts on Sonoran desert tortoise would likely occur. Direct impacts include mortality from humans through mechanisms such as vehicle collisions or targets placed on hillsides where tortoises are burrowing. Indirect impacts include hibernation disruption, increased mortality caused by predators, and other human disturbance, which could increase delayed mortality. Both direct and indirect impacts would likely be moderate in intensity, with the exception of hibernation disruption impacts, which would be minor.

Desert Bighorn Sheep

The acres of desert bighorn sheep habitat that would be available to recreational target shooting under each alternative are presented in **Table 4-3**. Since the entire SDNM would be available to recreational target shooting under Alternative A, all desert bighorn sheep habitat in the SDNM could continue to be potentially impacted over the long term, as described under the *Nature and Type of Effects*. Impacts will likely occur in areas of high use for recreational target shooting.

Desert bighorn sheep prefer open terrain and could be killed accidentally by recreational target shooters. This direct impact is likely to be long-term and minor in intensity.

Table 4-3
Acres of Desert Bighorn Sheep Habitat Available to Recreational Target Shooting by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Desert bighorn sheep habitat	159,400	157,000	149,200	14,600	0

Source: BLM GIS 2016

Direct impacts from human disturbance on desert bighorn sheep would continue, with long-term impacts including habitat avoidance and changes in movement patterns.

Indirectly, impacts include changes in habitat use and increased risk of mortality later in time. Desert bighorn sheep may move further away from areas where

recreational target shooting occurs to rest or bed down, which may require higher energy expenditures. Increased energy expenditures, and reduced access to forage could increase the risk of mortality. This indirect impact would likely be moderate in intensity.

Direct impacts on desert bighorn sheep include habitat avoidance, changes in movement patterns, and direct mortality. These impacts would generally be moderate in intensity. Indirect impacts on desert bighorn sheep include changes in habitat use over time and increased risk of mortality due to higher energy expenditures and limited access to forage resources. Indirect impacts would likely be moderate.

Mule Deer

The acres of mule deer habitat that would be available to recreational target shooting under each alternative are presented in **Table 4-4**. Since the entire SDNM would be available to recreational target shooting under Alternative A, all mule deer habitat in the SDNM could continue to be potentially impacted over the long term, as described under the *Nature and Type of Effects*. Impacts are most likely to occur in areas of high recreational target shooting use. Direct and indirect impacts would likely be minor.

Table 4-4
Acres of Mule Deer Habitat Available to Recreational Target Shooting by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Mule deer habitat	397,000	391,600	383,500	135,000	0

Source: BLM GIS 2016

Mule deer could be killed accidentally by recreational target shooters. This direct impact is likely to be long-term and minor in intensity.

Human development generally reduces mule deer use of an area. Therefore, indirect impacts include avoidance of forage sites or cover areas where recreational shooting occurs, which may increase the risk of mortality due to malnutrition or predation (malnutrition is often the leading cause of mule deer mortality; Innes 2013). These indirect impacts would be minor in intensity.

Both direct and indirect impacts on mule deer would occur under Alternative A. Direct impacts include mortality from recreational target shooters. Indirect impacts include reduced use of forage or cover sites, which could increase the risk of mortality. These indirect impacts would be minor in intensity.

Sonoran Pronghorn Antelope

While Sonoran pronghorn antelope currently do not occur in the SDNM, future introductions are a reasonably foreseeable future action. The entire decision area is included in the nonessential experimental population "10(j)" area. The

Draft Sonoran Pronghorn Recovery Plan identifies only that portion of the decision area south of Interstate 8 as within the Sauceda Reintroduction Management Unit. The acres of Sonoran pronghorn 10J areas that would be available to recreational target shooting under each alternative are presented in **Table 4-5**. Since the entire SDNM would be available to recreational target shooting under Alternative A, recreational target shooting may directly affect Sonoran pronghorn by preventing them from entering an area or reaching water sources.

Table 4-5
Acres of Sonoran Pronghorn 10J Experimental Population Area Available to Recreational Target Shooting by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Acres of Sonoran Pronghorn 10J Exper. Pop. Area	486,300	476,200	433,500	166,500	0

Source: BLM GIS 2016

Recreational shooting may indirectly result in mortality of individuals by impeding movement between areas as water and forage conditions change, particularly during times of drought. Direct and indirect impacts are likely to be long-term and minor in intensity. Population monitoring of experimental populations would occur.

Following Sonoran pronghorn antelope reintroductions, direct and indirect impacts on 10J populations could occur. Direct and indirect impacts would generally be long-term and moderate in intensity.

Raptors

Under Alternative A, recreational target shooting would continue to cause some degradation of foraging habitats over the long term as described under the *Nature and Type of Effects*. Nesting habitats could be directly disturbed or degraded for some raptor species, such as the cactus ferruginous pygmy-owl. Nesting habitat for other species, such as cliff-nesting prairie falcons, is unlikely to be directly impacted by recreational target shooting. Most raptors nest in the summer when recreational target shooting is less frequent. Given the area available for foraging and nesting, impacts are likely to be minor.

Human disturbance of nesting raptors would continue to occur as described under the *Nature and Type of Effects*. These types of impacts could be direct or indirect. Direct impacts include behavioral changes such as increased energy expenditure, reduced food intake, and habitat avoidance. Indirect impacts include reduced access to resources, which could increase the likelihood of recruitment failure or nest abandonment (Gutzwiller et al. 1998). While the

extent of current impacts is unknown, the potential for future impacts is likely to be minor.

Overall, both direct and indirect impacts on raptors would occur. For reasons described above, both direct and indirect impacts would generally be minor in intensity.

Other Priority Wildlife Species and Habitat

Saguaros are Monument objects and provide food, water, and shelter to wildlife species in the SDNM. Under Alternative A, recreational target shooting would directly damage or destroy saguaros (as discussed under **Section 4.2.5**, Vegetation). This could result in a loss of food supply, cover, and breeding sites for wildlife species. Other direct impacts include avoidance of saguaros or nest abandonment, due to increased noise levels. In addition, recreational target shooting at saguaros could indirectly affect wildlife habitat use later in time. For example, destruction or damage to saguaros may cause cavity nesting species to choose less suitable nest locations, which may not adequately meet foraging, thermoregulatory, or predator protection needs. These direct impacts would be minor and long-term.

Overall, direct and indirect impacts on other priority wildlife species and habitats would be moderate in intensity.

Wildlife Movement Corridors and Water Catchments

The acres of wildlife movement corridors that would be available to recreational target shooting under each alternative are presented in **Table 4-6**. All lands identified as wildlife movement corridors (100 acres) would be available to recreational target shooting under Alternative A. Recreational target shooting in these wildlife corridors may result in behavioral modification (such as habitat avoidance and reduced use of corridors), as well as potential habitat disturbance and wildlife mortality. These types of impacts would be direct, temporary, and minor in intensity.

Table 4-6
Acres of Wildlife Movement Corridors Available to Recreational Target Shooting by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Acres of wildlife movement corridors	100	100	100	100	0

Source: BLM GIS 2016

Recreational target shooting in wildlife corridors may also result in indirect impacts. Far-ranging mammals such as mule deer, bobcat, javelina, and mountain lion often travel long distances to access suitable foraging or breeding sites

(Beier et al. 2008). Less mobile species such as Gila monsters also require corridors for maintaining genetic diversity, allowing populations to shift in response to climate change, and promote recolonization after epidemics or fire (Beier et al. 2008). Therefore, avoidance of corridors for these species could indirectly result in mortality or recruitment failure over the long term. Wildlife use of movement corridors occurs at night, while recreational shooting is limited to daytime hours. Recreational shooting during the day is unlikely to limit the use of corridors.

The number of wildlife water catchments that would be available to recreational target shooting under each alternative is presented in **Table 4-7**. All wildlife water catchments would be available to recreational target shooting under Alternative A. As such, wildlife species may avoid all water catchments in the SDNM. Wildlife use of water catchments occurs at night, while recreational shooting is limited to daytime hours. Recreational shooting during the day is unlikely to limit the use of water catchments. These types of impacts would be short- and long-term, direct, and minor in intensity.

Table 4-7
Number of Wildlife Water Catchments in Areas Available to Recreational Target Shooting by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Number of wildlife water catchments	24	20	21	14	0

Source: BLM GIS 2016

Avoidance of water catchments could indirectly increase mortality, particularly for species that depend on catchments during times of drought. These indirect impacts would be short- and long-term, and moderate in intensity.

Monitoring and Mitigation

Since the entire decision area would be available for recreational target shooting under Alternative A (486,400 acres), there would be a high likelihood that the BLM would have to implement mitigation measures. Applying mitigation measures that do not restrict an area to recreational target shooting would reduce the potential for wildlife mortality and loss of important habitat components (compared to if no mitigation measures were applied); however, these measures would not eliminate impacts. Mitigation measures that restrict recreational target shooting temporarily or permanently would limit the potential for disturbance, wildlife mortality, and changes in wildlife use over the long term. The extent of impacts would vary based on the amount of land where discretionary restrictions would be applied.

Alternative B

Sonoran Desert Tortoise

Under Alternative B, fewer Category I and II habitats (a 4 percent decrease in Category I and less than 1 percent decrease in Category II habitats) would be available for recreational target shooting compared with Alternative A. The acres of Category III habitat that would be available would be the same as under Alternative A (3,500 acres; see **Table 4-2**). Given the small magnitude of change in acres, impacts on desert tortoise habitat are expected to be similar to those described under Alternative A and moderate in intensity.

The reduction in acres of desert tortoise habitat that would be available to recreational target shooting under Alternative B would also reduce the likelihood for mortality caused by predators compared with Alternative A. However, given the small magnitude of change in acres, direct impacts are still expected to be moderate.

Indirect impacts from recreational target shooting noise and human presence under Alternative A resulting in hibernation disruption or release of bladder contents would likely still occur under Alternative B, causing similarly minor impacts.

Desert Bighorn Sheep

Under Alternative B, fewer acres of desert bighorn sheep habitat (a 2 percent decrease, or 2,400-acre reduction) would be available for recreational target shooting compared with Alternative A (see **Table 4-3**). The reduction in acres of desert bighorn sheep habitat that would be available to recreational target shooting under Alternative B would also reduce the likelihood for mortality caused by predators compared with Alternative A. However, given the small magnitude of change in acres, impacts are still expected to be minor.

Direct and indirect impacts from human disturbance described under Alternative A would likely still occur under Alternative B, causing similarly moderate impacts.

Mule Deer

Under Alternative B, fewer acres of mule deer habitat (a 1 percent decrease, or 5,500-acre reduction) would be available for recreational target shooting compared with Alternative A (see **Table 4-4**). Given the small magnitude of change in acres, direct impacts on mule deer habitat are expected to be similar to those under Alternative A and minor in intensity.

The reduction in acres of mule deer habitat that would be available to recreational target shooting under Alternative B would also reduce the likelihood for mortality caused by humans compared with Alternative A. However, given the small magnitude of change in acres, indirect impacts are still expected to be minor.

Direct and indirect impacts from human disturbance described under Alternative A would likely still occur under Alternative B, causing similarly minor impacts.

Sonoran Pronghorn Antelope

Under Alternative B, there would be a 2 percent reduction (or 10,100-acre reduction) in Sonoran pronghorn antelope 10J experimental population areas available to recreational target shooting compared with Alternative A (see **Table 4-5**). Given the small magnitude of change in acres, direct and indirect impacts on Sonoran pronghorn antelope are expected to be similar to those under Alternative A and minor in intensity.

Raptors

Under Alternative B, fewer acres of the decision area (a 2 percent decrease, or 10,100-acre reduction), and thus fewer acres of raptor habitats, would be available for recreational target shooting compared with Alternative A. Impacts on raptor nesting and foraging habitats could still occur in the areas available for recreational target shooting; thus, impacts would be similar to those under Alternative A and minor in intensity.

The reduction in acres of raptor habitat that would be available to recreational target shooting under Alternative B would also reduce the likelihood for mortality caused by humans compared with Alternative A. Given the small magnitude of change in acres, direct impacts are still expected to be minor.

Direct and indirect impacts from human disturbance described under Alternative A would likely still occur under Alternative B, causing similarly minor impacts.

Other Priority Wildlife Species and Habitat

Impacts on priority wildlife species that utilize saguaros would be similar to those impacts described under Alternative A (e.g., loss of food supply, cover, and breeding sites, and the potential for nest abandonment, destruction, and avoidance). Because there would be a 2 percent reduction in lands available to recreational target shooting (10,100-acre reduction), direct and indirect impacts would occur in slightly fewer areas compared with Alternative A, and would be minor in intensity.

Wildlife Movement Corridors and Water Catchments

The acres of wildlife movement corridors that would be available to recreational target shooting under Alternative B are the same as those described under Alternative A (100 acres; see **Table 4-6**). Therefore, direct and indirect impacts would be minor, as described under Alternative A.

There would be 20 wildlife water catchments in areas available to recreational target shooting under Alternative B, 4 fewer than under Alternative A (see **Table 4-7**). Direct and indirect impacts would be minor, similar to those under

Alterative A, except near the 4 catchments where recreational target shooting would be restricted. In these areas, impacts would not likely occur, or would be minor.

Monitoring and Mitigation

Because 98 percent of the decision area (476,300 acres) would be available for recreational target shooting, there would likely be a similar amount of recreational target shooting as under Alternative A, resulting in approximately the same potential need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a slightly smaller area under Alternative B.

Alternative C

Sonoran Desert Tortoise

Under Alternative C, fewer Category I and II habitats (a 14 percent decrease in Category I and 6 percent decrease in Category II habitats) would be available for recreational target shooting compared with Alternative A. The acres of Category III habitat that would be available would be the same as under Alternative A (3,500 acres; see **Table 4-2**). Given the small magnitude of change in acres, indirect impacts on desert tortoise habitat are expected to be similar to those under Alternative A and moderate in intensity.

The reduction in acres of desert tortoise habitat that would be available to recreational target shooting under Alternative C would also reduce the likelihood for mortality caused by predators compared with Alternative A. However, given the small magnitude of change in acres, direct and indirect impacts are still expected to be minor.

Impacts from human disturbance described under Alternative A would likely still occur under Alternative C, causing similarly minor impacts.

Desert Bighorn Sheep

Under Alternative C, fewer acres of desert bighorn sheep habitat (a 6 percent decrease, or 10,200-acre reduction) would be available for recreational target shooting compared with Alternative A (see **Table 4-3**). The reduction in acres of desert tortoise habitat that would be available to recreational target shooting under Alternative C would also reduce the likelihood for mortality caused by vehicles or predators compared with Alternative A. However, given the small magnitude of change in acres, direct and indirect impacts are still expected to be minor.

Direct and indirect impacts from human disturbance described under Alternative A would likely still occur under Alternative C, causing similarly moderate impacts.

Mule Deer

Under Alternative C, fewer acres of mule deer habitat (a 3 percent decrease, or 13,500-acre reduction) would be available for recreational target shooting compared with Alternative A (see **Table 4-4**). Given the small magnitude of change in acres, indirect impacts on mule deer habitat are expected to be similar to those under Alternative A and minor in intensity.

The reduction in acres of mule deer habitat that would be available to recreational target shooting under Alternative C would also reduce the likelihood for mortality caused by humans compared with Alternative A. However, given the small magnitude of change in acres, direct impacts are still expected to be minor.

Direct and indirect impacts from human disturbance described under Alternative A would likely still occur under Alternative C, causing similarly minor impacts.

Sonoran Pronghorn Antelope

Under Alternative C, there would be an 11 percent reduction (or 52,800-acre reduction) in Sonoran pronghorn antelope 10J experimental population areas available to recreational target shooting compared with Alternative A (see **Table 4-5**). Given the small magnitude of change in acres, direct and indirect impacts on Sonoran pronghorn antelope are expected to be similar to those under Alternative A and minor in intensity.

Raptors

Under Alternative C, fewer acres of the decision area (an 11 percent decrease, or 52,800-acre reduction), and thus fewer acres of raptor habitats, would be available for recreational target shooting compared with Alternative A. Impacts on raptor nesting and foraging habitats could still occur in the areas available for recreational target shooting; thus, direct and indirect impacts would be similar to those under Alternative A and minor in intensity.

The reduction in acres of raptor habitat that would be available to recreational target shooting under Alternative C would also reduce the likelihood for mortality caused by humans compared with Alternative A. Given the small magnitude of change in acres, direct impacts are still expected to be minor.

Direct and indirect impacts from human disturbance described under Alternative A would likely still occur under Alternative C, causing similarly minor impacts.

Other Priority Wildlife Species and Habitat

Impacts on priority wildlife species that utilize saguaros would be similar to those impacts described under Alternative A (loss of food supply, cover, and breeding sites, and the potential for nest abandonment, destruction, and avoidance). Because there would be an 11 percent reduction in lands available

to recreational target shooting (52,800 acres), impacts would occur in fewer areas compared with Alternative A, and would still be expected to be minor in intensity.

Wildlife Movement Corridors and Water Catchments

The acres of wildlife movement corridors that would be available to recreational target shooting under Alternative C are the same as those described under Alternative A (100 acres; see **Table 4-6**). Therefore, direct and indirect impacts would be minor, as described under Alternative A.

There would be 21 wildlife water catchments in areas available to recreational target shooting under Alternative C, 3 fewer than under Alternative A (see **Table 4-7**). Direct and indirect impacts would likely be minor, similar to those under Alterative A, except near the 3 catchments where recreational target shooting is restricted. In these areas, direct and indirect impacts would not likely occur, or would be minor.

Monitoring and Mitigation

Because 89 percent of the decision area (433,600 acres) would be available for recreational target shooting, there would likely be less recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative C.

Alternative D

Sonoran Desert Tortoise

Under Alternative D, fewer acres of all habitat categories would be available for recreational target shooting compared with Alternative A (see **Table 4-2**). This includes an 83 percent decrease in Category I (138,000 acres), 82 percent decrease in Category II (102,600 acres), and 9 percent decrease (300 acres) in Category III habitats. Given the magnitude of change in acres, direct and indirect impacts on desert tortoise habitat are expected to be reduced compared with Alternative A and minor in intensity.

The reduction in acres of desert tortoise habitat that would be available to recreational target shooting under Alternative D would also reduce the likelihood for mortality caused by predators compared with Alternative A. Given the magnitude of change in acres, direct impacts are likely to be reduced to minor.

Impacts from human disturbance described under Alternative A (hibernation disruption and depletion of bladder contents) would likely still occur under Alternative D, causing similarly minor indirect impacts.

Desert Bighorn Sheep

Under Alternative D, fewer acres of desert bighorn sheep habitat (a 91 percent decrease, or 144,800-acre reduction) would be available for recreational target shooting compared with Alternative A (see **Table 4-3**). The reduction in acres of desert bighorn sheep habitat that would be available to recreational target shooting under Alternative B would also reduce the likelihood for mortality caused by predators compared with Alternative A. Given the magnitude of change in acres, direct and indirect impacts are likely to remain minor.

Direct and indirect impacts from human disturbance described under Alternative A would likely still occur under Alternative D, though on far fewer acres of desert bighorn sheep habitat. As a result, impacts are likely to be reduced to minor.

Mule Deer

Under Alternative D, fewer acres of mule deer habitat (a 66 percent decrease, or 262,000-acre reduction) would be available for recreational target shooting compared with Alternative A (see **Table 4-4**). Given the magnitude of change in acres, direct and indirect impacts on mule deer habitat are expected to be reduced compared with Alternative A and remain minor in intensity.

The reduction in acres of mule deer habitat that would be available to recreational target shooting under Alternative D would also reduce the likelihood for mortality caused by humans compared with Alternative A. Given the magnitude of change in acres, direct impacts are likely to remain minor.

Direct and indirect impacts from human disturbance described under Alternative A would likely still occur under Alternative D, though on far fewer acres of mule deer habitat. As a result, impacts are likely to remain minor.

Sonoran Pronghorn Antelope

Under Alternative D, there would be a 66 percent reduction (or 319,900-acre reduction) in Sonoran pronghorn antelope 10J experimental population areas available to recreational target shooting compared with Alternative A (see **Table 4-5**). As such, recreational target shooting would be less likely to impact the success of future experimental Sonoran pronghorn populations. However, there would still be 10J areas available to recreational target shooting under Alternative D, and habitat avoidance or interference with movement patterns could still occur after experimental populations are introduced. Direct and indirect impacts would likely be minor in intensity.

Raptors

Under Alternative D, fewer acres of the decision area (a 66 percent decrease, or 319,900-acre reduction), and thus fewer acres of raptor habitats, would be available for recreational target shooting compared with Alternative A. Impacts on raptor nesting and foraging habitats could still occur in the areas available for

recreational target shooting; thus, direct and indirect impacts would be similar to Alternative A and minor in intensity.

The reduction in acres of raptor habitat that would be available to recreational target shooting under Alternative D would also reduce the likelihood for mortality caused by humans compared with Alternative A. Given the magnitude of change in acres, direct impacts are likely to remain minor.

Direct and indirect impacts from human disturbance described under Alternative A would likely still occur under Alternative D, though on far fewer acres of raptor habitats. As a result, impacts are likely to remain minor.

Other Priority Wildlife Species and Habitat

Impacts on priority wildlife species that utilize saguaros would be similar to those impacts described under Alternative A (loss of food supply, cover, and breeding sites, and the potential for nest abandonment, destruction, and avoidance). Because there would be a 66 percent reduction (or 319,900-acre reduction) in lands available to recreational target shooting, direct and indirect impacts would occur in fewer areas compared with Alternative A and would be minor in intensity.

Wildlife Movement Corridors and Water Catchments

The acres of wildlife movement corridors that would be available to recreational target shooting under Alternative D are the same as those described under Alternative A (100 acres; see **Table 4-6**). Therefore, direct and indirect impacts would be minor, as described under Alternative A.

There would be 14 wildlife water catchments in areas available to recreational target shooting under Alternative D; 10 fewer than Alternative A (see **Table 4-7**). Direct and indirect impacts would likely be minor, similar to Alterative A, except near the 10 catchments where recreational target shooting is restricted. In these areas, impacts would not likely occur or would be minor.

Monitoring and Mitigation

Because 34 percent of the decision area (166,500 acres) would be available for recreational target shooting, there would likely be less recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative D.

Alternative E

All Species and Habitats

Under Alternative E, the entire decision area (486,400 acres) would be restricted to recreational target shooting, and no priority wildlife habitat would be available to this use. As a result, direct and indirect impacts from habitat

disturbance, mortality, and human presence would be expected to be negligible under this alternative.

Monitoring and Mitigation

Under Alternative E, monitoring would help ensure the proposed restriction of the decision area for recreational target shooting (486,400 acres) would be expected to be enforced and the potential for impacts on priority wildlife species and habitat would be eliminated.

4.2.4 Soil Resources

This section discusses impacts on soil resources from the proposed alternatives in Chapter 2. Existing conditions concerning soil resources are described in **Section 3.2.4**, Soil Resources. The region of influence for analyzing impacts on soil resources is the decision area.

Methods of Analysis

Impacts were determined by assessing which actions, if any, would change the indicators described below. Impacts were quantified, where possible. In the absence of quantitative data, best professional judgment was used, based on a review of the scientific literature and BLM data. Impacts are sometimes described using ranges of potential impacts or in qualitative terms, if appropriate.

Indicators of impacts on soil resources include the following:

- Declining soil health, as expressed through biological processes, such as loss of vegetation cover and soil organic matter, or through physical or chemical degradation, with soils that are either unable to support vegetation or that are not functioning at potential for a particular ecological site (e.g., vegetation type, diversity, density, and vigor) as a result of nutrient depletion, or a change in porosity, fertility, and resistance to erosion
- Acres of BLM-administered land available to recreational target shooting
- Acres of BLM-administered land with sensitive soils available to recreational target shooting

Some impacts are direct, while others are indirect and affect soil resources through a change in another resource. Direct impacts on soil resources include eroding, compacting, or disturbing soils. Indirect impacts are those that occur later in time or farther removed in distance, such as decreased plant vigor or health that increases the potential for erosion of soil.

The analysis includes the following assumptions:

- Soils on BLM-administered lands would be managed to minimize erosion and maintain inherent productivity. Proposed surface-disturbing projects would be analyzed to determine the suitability of soils to support or sustain such projects, which would be designed to minimize soil loss.
- Surface-disturbing activities would require standard operating procedures and BMPs to reduce impacts on soil resources
- Sensitive soils have characteristics that make them extremely susceptible to impacts and difficult to restore or reclaim
- As slopes increase, the risk of soil instability following disturbance increases, particularly if cover, structure, permeability, or bulk density has been altered (Monsen et al. 2004)
- Soils with high erodibility have a significantly lower probability of success for restoration than soils with less erosion potential

Nature and Type of Effects

Surface Disturbances

Managing surface-disturbing activities, especially in areas with sensitive soils or steep slopes, would preserve soil components by limiting human impacts. This would inherently improve soil health and functionality by increasing vegetation cover, soil development, soil organic matter, fertility, and water-holding capacity and by reducing soil loss from wind and water erosion.

Surface-disturbing activities would reduce ground cover and increase soil compaction or removal. Loss of vegetation would expose soil to accelerated wind and water erosion and would result in the irretrievable loss of topsoil and nutrients. This disturbance would also change soil structure, heterogeneity (variable characteristics), temperature regimes, nutrient cycling, biotic richness, and diversity.

Factors that affect reclamation suitability, and eventual restoration suitability, are the relative risk of water and wind erosion, salinization, organic matter and nutrient depletion, precipitation, excess steepness or coarse fragments that limit common rehabilitation practices, topsoil loss, or the loss of adequate rooting depth required to maintain desired plant communities. Restoration potential is based on soil resilience, which is the inherent ability of the soil to recover from degradation. The ability to recover from degradation means the ability to restore functional and structural integrity after a disturbance. Important soil functions are as follows:

- Sustain biological activity, diversity, and productivity
- Capturing, storing, and releasing water
- Storing and cycling nutrients and other elements

- Filtering, buffering, degrading, immobilizing, and detoxifying contaminants
- Providing support for plant and animal life

Sensitive Soils

As described in the Sonoran Desert Rapid Ecoregional Assessment Final Report, Sonoran Desert soils contain a high level of soluble salts and low humus content. Aridisol and Entisol soil orders are dominant with thermic and hyperthermic soil temperatures and aridic soil moisture regimes (McAuliffe 1994). Calcium carbonate commonly precipitates out in the soil to produce a caliche layer that restricts the downward movement of water (McAuliffe 2000). Sonoran Desert soils are sensitive with sparse vegetative cover and exposed to erosion by a number of natural and anthropogenic change agents. Soils on bajada slopes vary from rocky, colluvial material near the top to finer materials at the base. Finer silts and clays are carried to the basins by wind and water erosion where they have accumulated to 1000s of feet deep (McAuliffe 2000).

Persistent wind and wind erosion of soil is a natural phenomenon in desert ecosystems, but human activities including energy and urban development, utility corridors, agriculture, recreation, and grazing all disturb the soil surface, exposing it to erosion. Wind erosion removes nutrients and growing medium from shallow desert soils and semi-arid agricultural areas. Airborne soil particles affect air quality and visibility, nutrient balance, and spring snowmelt in mountainous areas downwind, and blowing dust creates a health and safety hazard for the region's residents (Neff et al. 2008). Evidence suggests that accelerated wind erosion has occurred since Euro-American settlement and may increase in the future with increasing drought predicted under future climate change (Neff et al. 2008).

Contamination

Recreational target shooting involves the use of ammunition and materials that remain in the environment. These materials can contaminate soil directly if deposited onto soil, leading to diminished soil quality. These materials may also be washed to other locations downstream from the planning area through overland flow, indirectly impacting soil quality and concentrating the materials in those locations. These impacts can be short-term or long-term, depending on season of use, type of use, and intensity of use. The arid environment does inhibit or severely slow the decomposition of materials that might eventually be incorporated or absorbed into the soils.

Authorized Uses

Management that affects the location of recreational target shooting can affect the intensity of impacts on soils. Fencing off areas or erecting signs confines impacts on certain areas and reduces impacts outside the area. This technique can be used to reduce impacts on soil resources.

The timing of recreational target shooting also affects the intensity of impacts. Implementing season of use for certain areas may also reduce impacts during periods when soils may be more highly erodible or compactable.

Effects Common to All Alternatives

Under all alternatives, the BLM would implement mitigation and monitoring, which would reduce the potential for and intensity of impacts on soil resources as described in the *Nature and Type of Effects*. For Alternatives A through D, the BLM would implement strategies to mitigate or reduce impacts on soil resources involving surface disturbances and contamination based on monitoring results. Examples of mitigation measures that would not restrict recreational target shooting include increased patrols, site cleanup efforts, and revegetation. These measures would directly and indirectly benefit soil resources by reducing the intensity of surface disturbance and improving soil stability. Mitigation that results in temporary or permanent restrictions on recreational target shooting would be expected to result in short-term or long-term reductions, respectively, in impacts on soil resources associated with recreational target shooting. Mitigation measures that restrict recreational target shooting temporarily or permanently would have a greater influence on soil resources than applying mitigation measures that do not restrict recreational target shooting, because surface disturbances and the use of ammunition and materials that remain in the environment during recreational target shooting would not occur in areas where recreational target shooting is restricted. For Alternative E, monitoring would help ensure the proposed closure of the SDNM to recreational target shooting would be enforced and the potential for impacts on soil resources involving surface disturbances and contamination would be reduced as visitors seeking recreational target shooting experiences would move to areas outside of the SDNM.

Alternative A

There are 207,000 acres of sensitive soils in the 486,400-acre decision area (BLM GIS 2016). **Table 4-8**, below, shows the acres of sensitive soils in areas available for recreational target shooting under Alternative A.

Table 4-8
Recreational Target Shooting Availability and Sensitive Soils– Alternative A

Recreational Target Shooting	Sensitive Soils (acres)	Percent of Sensitive Soils
Available	207,000	100
Restricted	0	0

Source: BLM GIS 2016

Under Alternative A, all of the decision area would continue to be available to recreational target shooting. Consequently, all sensitive soils would continue to be in areas where recreational target shooting could occur. There would be no

change in the ongoing minor to moderate impacts on soil health described above under *Nature and Type of Effects* or in the acres of BLM-administered land with sensitive soils available to recreational target shooting.

Mitigation

Since the entire decision area would be available for recreational target shooting under Alternative A, there would be a higher likelihood that the BLM would have to implement mitigation measures to reduce impacts on soil health and sensitive soils. Applying mitigation measures that do not restrict an area to recreational target shooting could result in a reduction in surface disturbances and contamination by promoting better recreational target shooting practices and limiting surface disturbance. Mitigation measures that restrict recreational target shooting temporarily or permanently would result in the short- and long-term reduction of shooting-related surface disturbances and contamination in the restriction area. Mitigation measures that restrict recreational target shooting temporarily or permanently would have a greater influence on soil resources than applying mitigation measures that do not restrict an area to recreational target shooting, because surface disturbances and the use of ammunition and materials that remain in the environment during recreational target shooting would not occur in areas restricted to recreational target shooting.

Alternative B

There are 207,000 acres of sensitive soils in the 486,400-acre decision area (BLM GIS 2016). **Table 4-9**, Recreational Target Shooting Availability and Sensitive Soils–Alternative B, shows the acres of sensitive soils in areas available to recreational target shooting under Alternative B.

Table 4-9
Recreational Target Shooting Availability and Sensitive Soils–Alternative B

Recreational Target Shooting	Sensitive Soils (acres)	Percent of Sensitive Soils
Available	201,400	97
Restricted	5,500	3

Source: BLM GIS 2016

Under Alternative B, the area that is temporarily restricted under the 2015 court order (approximately 10,100 acres) would become permanently restricted to recreational target shooting, while the rest of the decision area would be available to recreational target shooting. Compared with Alternative A, there would be no change in ongoing minor to moderate impacts on soil health described above under *Nature and Type of Effects* on all but 10,100 acres of the decision area. For the 10,100 acres of BLM-administered land restricted to recreational target shooting, the direct impacts on soil health from recreational target shooting would cease.

Under Alternative B, approximately 97 percent of sensitive soils (201,400 acres) in the decision area would remain available for recreational target shooting. Compared with Alternative A, there would be no change in ongoing minor to moderate impacts on sensitive soils described above under *Nature and Type of Effects* in these areas. For the 5,500 acres of sensitive soils restricted to recreational target shooting, the direct impacts from recreational target shooting would cease.

Areas where recreational target shooting would be restricted could experience indirect impacts on soils if other types of activities become more prevalent in those areas. These other activities would have their own impacts on soil health and sensitive soils, depending on the timing, duration, and location of the activities and the types of activities. Overall, impacts on soil health and sensitive soils would be less than under Alternative A by a negligible to minor amount because more areas would be restricted to recreational target shooting, reducing the potential for surface disturbances and the use of ammunition and materials that remain in the environment in these areas.

Because 2 percent of BLM-administered surface land (including 3 percent of sensitive soils) would be restricted for recreational target shooting, there would be no need to implement additional mitigation measures in these areas to reduce impacts on soil resources. Impacts after applying mitigation measures would be as described for Alternative A, but they would affect a slightly smaller area under Alternative B.

Alternative C

There are 207,000 acres of sensitive soils in the 486,400-acre decision area (BLM GIS 2016). **Table 4-10**, Recreational Target Shooting Availability and Sensitive Soils–Alternative C, shows the acres of sensitive soils in areas available to recreational target shooting under Alternative C.

Table 4-10
Recreational Target Shooting Availability and Sensitive Soils–Alternative C

Recreational Target Shooting	Sensitive Soils (acres)	Percent of Sensitive Soils
Available	177,100	86
Restricted	29,900	14

Source: BLM GIS 2016

Under Alternative C, recreational target shooting would be available in the Desert Back Country RMZ (approximately 433,600 acres, or 89 percent of the decision area). Recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ (approximately 52,800 acres, or 11 percent of the decision area). The Juan Bautista de Anza NHT RMZ contains the Butterfield Pass Trail, the Mormon Battalion Trail, and the Juan Bautista de Anza NHT.

Compared with Alternative A, there would be no change in the ongoing minor to moderate impacts on soil health described under *Nature and Type of Effects* for the 433,600 acres of land available to recreational target shooting. For the 52,800 acres of land restricted to recreational target shooting, the direct impacts on soil health from recreational target shooting would cease.

Under Alternative C, approximately 86 percent of sensitive soils (177,100 acres) in the decision area would remain available for recreational target shooting. Compared with Alternative A, there would be no change in ongoing minor to moderate impacts on sensitive soils described under *Nature and Type of Effects* in these areas. For the 29,900 acres of sensitive soils restricted to recreational target shooting, the direct impacts from recreational target shooting would cease.

As described under Alternative B, areas where recreational target shooting would be restricted could experience indirect impacts on soils if other types of activities become more prevalent in those areas. These other activities would have their own impacts on soil health and sensitive soils, depending on the timing, duration, and location of the activities and the types of activities. Overall, impacts on soil health and sensitive soils would be less than under Alternative A by a minor to moderate amount because more areas would be restricted to recreational target shooting, reducing the potential for surface disturbances and the use of ammunition and materials that remain in the environment in these areas.

Because 11 percent of BLM-administered surface land (including 14 percent of sensitive soils) would be restricted for recreational target shooting, there would be no need to implement additional mitigation measures in these areas in order to reduce impacts on surface water involving surface disturbances and contamination. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative C.

Alternative D

There are 207,000 acres of sensitive soils in the 486,400-acre decision area (BLM GIS 2016). **Table 4-11**, Recreational Target Shooting Availability and Sensitive Soils–Alternative D, shows the acres of sensitive soils shows the acres of sensitive soils in areas available to recreational target shooting under Alternative D.

Under Alternative D, the Juan Bautista de Anza NHT RMZ (including the Butterfield Pass Trail, the Mormon Battalion Trail, and the Juan Bautista de Anza NHT), three designated Wilderness units, and one area managed for wilderness characteristics would be restricted to recreational target shooting (approximately 319,900 acres, or 66 percent of the decision area). Compared with Alternative A, there would be no change in the ongoing minor to moderate

Table 4-11
Recreational Target Shooting Availability and Sensitive Soils–
Alternative D

Recreational Target Shooting	Sensitive Soils (acres)	Percent of Sensitive Soils
Available	66,100	32
Restricted	140,800	68

Source: BLM GIS 2016

impacts on soil health described under *Nature and Type of Effects* for the 164,500 acres (34 percent of the decision area) available to recreational target shooting. For the 319,900 acres of BLM-administered land restricted to recreational target shooting, the direct impacts on soil health from recreational target shooting would cease.

Under Alternative D, approximately 32 percent of sensitive soils (66,100 acres) in the decision area would remain available for recreational target shooting. Compared with Alternative A, there would be no change in the ongoing minor to moderate impacts on sensitive soils described under *Nature and Type of Effects* in these areas. For the 140,800 acres of sensitive soils restricted to recreational target shooting, the direct impacts from recreational target shooting would cease.

As described under Alternative B, areas where recreational target shooting would be restricted could experience indirect impacts on soils if other types of activities become more prevalent in those areas. These other activities would have their own impacts on soil health and sensitive soils, depending on the timing, duration, and location of the activities and the types of activities. Overall, impacts on soil health and sensitive soils would be less than under Alternative A by a minor to moderate amount because more areas would be restricted to recreational target shooting, reducing the potential for surface disturbances and the use of ammunition and materials that remain in the environment in these areas.

Because 66 percent of BLM-administered surface land (including 68 percent of sensitive soils) would be restricted for recreational target shooting, there would be no need to implement additional mitigation measures in these areas in order to reduce impacts on surface water involving surface disturbances and contamination. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative D.

Alternative E

There are 207,000 acres of sensitive soils in the 486,400-acre decision area (BLM GIS 2016). **Table 4-12**, Recreational Target Shooting Availability and

Table 4-12
Recreational Target Shooting Availability and Sensitive Soils–Alternative E

Recreational Target Shooting	Sensitive Soils (acres)	Percent of Sensitive Soils
Available	0	0
Restricted	207,000	100

Source: BLM GIS 2016

Sensitive Soils–Alternative E, shows the acres of sensitive soils shows the acres of sensitive soils in areas available to recreational target shooting under Alternative E.

Under Alternative E, recreational target shooting would be restricted in all of the SDNM. Compared with Alternative A, the direct impacts on soil health and sensitive soils described under *Nature and Type of Effects* from recreational target shooting would cease throughout the SDNM. However, other activities in the SDNM may become more prevalent if recreational target shooting is restricted. These other activities would have their own impacts on soil health and sensitive soils, depending on the timing, duration, and location of the activities and the types of activities. Overall, impacts on soil health and sensitive soils would be less than under Alternative A by a moderate amount because more areas would be restricted to recreational target shooting, reducing the potential for surface disturbances and the use of ammunition and materials that remain in the environment in these areas.

Under alternative E, monitoring would help ensure the proposed restriction of the SDNM for recreational target shooting would be enforced and the potential for impacts on soil resources would be eliminated.

4.2.5 Vegetation

This section discusses impacts on vegetation resources (including vegetation communities, special status plant species, and Monument vegetation objects) from the proposed alternatives in **Chapter 2**. Existing conditions are described in **Section 3.2.5**, Vegetation Resources. The region of influence for direct and indirect impacts associated with management on vegetation resources is the SDNM planning area.

Methods of Analysis

The impact analysis will evaluate the direct and indirect impacts of the alternatives on a number of qualitative vegetation resources impact indicators. Indicators of impacts on vegetative communities include the following:

- Changes in vegetation community condition or extent
- Changes in Monument vegetation object condition or extent

- Loss or damage to individual special status plants, and changes in suitable or occupied habitat for special status plant species
- Changes in ecological conditions necessary to support functioning and healthy vegetation resources (e.g., changes in soil conditions such as compaction or loss of soil from erosion)
- Introduction and spread of nonnative, invasive plants

The analysis includes the following assumptions:

- The impacts analysis focuses on the direct and indirect impacts on vegetation resources from recreational target shooting only
- Recreational target shooting will share common impacts on vegetation resources with other forms of recreation (e.g., driving to access recreational target shooting locations can contribute to invasive plant spread along roadways). Common impacts shared with other forms of recreation as analyzed in the 2012 SDNM RMP and ROD remain valid but are not further discussed in this impact analysis.

Nature and Type of Effects

Vegetation can be mechanically damaged[1] or killed by recreational target shooting, resulting in changes to vegetation community and vegetation object condition and extent. Damage can occur from bullets that miss the target and strike nearby vegetation, by bullets that pass through targets that are propped against vegetation, or by persons who use vegetation as a target even though purposefully shooting vegetation is a violation of 43 CFR, Subpart 8365.1-5(a) (1) and (2). If damage is severe enough, it can result in plant mortality via toppling. Less severe damage can result in physiological impacts and increased susceptibility to extreme environmental conditions like drought and freezing temperatures.

Reducing vegetation structural diversity and cover often leads to increased soil erosion. This, in turn, can lead to changes in vegetation community or vegetation object condition or extent, loss of suitable special status species habitat, or changes in ecological conditions that support vegetation resources. Soil erosion rates on desert scrub and grassland communities are highly dependent on the proportion of soil surface protected from raindrop impacts by vegetation cover. Erosion rates increase exponentially as plant cover decreases (Meeuwig 1970). This can result in soil loss and conditions that are less supportive of native vegetation. Erosion can also scour soils away from plant roots, resulting in plant instability, loss, or susceptibility to extreme environmental conditions.

[1] Mechanical damage is a generalized term to describe physical damage to vegetation, usually inflicted by mechanical or mechanized equipment.

Recreational target shooting can mechanically damage or wound saguaro cactus, leading to changes in vegetation object condition and extent. Injury, including overwhelming mechanical damage, disrupts or disables the saguaro's normal physiological functions (Steenbergh and Lowe 1983). In healthy, mature saguaro cacti, mechanical damage or wounds such as woodpecker holes and boring larvae tunnels are often walled off by callus tissue (Niering et al. 1963; Steenbergh and Lowe 1983). Mechanical damage from bullet holes is likely similarly walled off. While such damage rarely kills the plant outright, it does increase vulnerability to freezing (the damage of which often initiates at tree-hole sites) or wind breakage. Decapitation or toppling is an occasional secondary result (Steenbergh and Lowe 1983). Similarly, excessive mechanical wounds inflicted by bullets can topple or de-limb saguaro cacti.

Recreational target shooting can be a source of heavy metal soil contamination (Jorgensen and Willems 1987; Rooney 2002; Migliorini et al. 2004, 2005). Heavy metal soil contamination may result in changes to ecological conditions that support vegetation resources. Metallic lead from bullet fragments that is deposited in recreational target shooting areas may eventually become oxidized and transformed into lead compounds. These compounds can become mobilized in soils and taken up by plants (Jorgensen and Willems 1987; Rooney 2002). Excess lead uptake can lead to stunted plant growth, reduced photosynthetic capacity, and upset in the nutritional and water balance (Sharma and Dubey 2005). This can affect individual plants as well as vegetation communities where heavy metal, including lead, contamination occurs over the long term. In a long-term exposure scenario, toxicity effects can be expressed in vegetation cover loss and marked modifications to vegetation structure (Kapustka et al. 1995; Galbraith et al. 1995).

Recreational target shooting can increase the chance of human-caused wildfire ignition, which can result in changes to vegetation community or vegetation object condition or extent, loss of special status plants or changes to special status plant habitat, and changes in ecological conditions that support vegetation resources. Rifle or other high-velocity bullet ricochets can start fires during appropriate environmental conditions and when bullet fragments come to rest in fine, dry, organic materials. Bullet impacts can generate high-temperature fragments (over 800 °C) that could act as ignition sources (Finney et al. 2013). This is particularly true for bullets containing steel cores or jackets or those made of solid copper (Finney et al. 2013).

Nonnative, invasive annual grasses like red brome and Mediterranean grass (*Schismus barbatus*) may provide suitable ignition materials during certain environmental conditions and if they are present in a recreational target shooting area. Since these species mostly occur in disturbed areas near roads in SDNM (Felger et al. 2001), their presence in areas used for recreational target shooting is likely.

Fuel moisture content, temperature, and humidity are important factors in fire ignition. In experimental conditions, fuel moisture contents of 3 to 5 percent, air temperatures of 34 to 49 °C (98 to 120 °F), and relative humidity of 7 to 16 percent were necessary to reliably observe ignitions from bullet fragments (Finney et al. 2013). Fuel moisture contents over about 8 percent did not result in ignitions. Field conditions in the SDNM matching these experimental conditions may be most likely to occur in the arid foresummer (mid-May to July) due to solar heating of the ground and organic matter, and before monsoonal precipitation increases fuel moisture content in the late summer.

Wildfire is not a major natural ecological process in the Sonoran Desert, because there is rarely sufficient fine fuel available to carry fire between widely spaced shrubs (Van Devender et al. 1997; Alford et al. 2005). However, nonnative annual grass species like red brome and Mediterranean grass have increasingly invaded inter-shrub spaces and are capable of carrying fire throughout the native vegetation community. This is especially the case following relatively wet seasons when annual grass growth is bolstered, leading to relatively high amounts of fine fuel loading.

Most of the dominant plants in Sonoran Desert vegetation communities—including trees like palo verde, ironwood, and shrubs like creosote bush and bursage—are readily killed by fire (Van Devender et al. 1997; Alford et al. 2005). In Arizona, fires in the arid foresummer (mid-May to July), primarily fueled by red brome, have increased dramatically in recent years, leading to relatively barren landscapes dominated by red brome and other annual plants at lower elevations (Van Devender et al. 1997). Along with changes in vegetation structure, such fires also lead to alterations in soil nutrient availability in the long term (Fuentez-Ramirez 2015).

Like other native Sonoran vegetation, saguaro cacti are not fire-adapted; this is indicated by a lack of post-fire flowering or seed stimulation (Thomas 1991), decreased vigor, and high rates of seedling and young cactus mortality following fire (Rogers 1985). Death of fire-injured mature saguaros may be delayed, however, for several years while the plant lives off stored reserves (Thomas 1991), potentially flowering and producing seed from unburned branches during this time (Pavek 1993). However, mature saguaro cacti do exhibit some characteristics that may aid in survival when burned. The cactus core is protected to a degree by tissue folds with a relatively high heat capacity (Pavek 1993), and mature saguaros develop a woody bark near the base that may resist burning (Thomas 1991).

Recreational target shooting can directly and indirectly impact special status plant species. If recreational target shooting were to occur in occupied habitat, mechanical damage to individual special status plants from bullets could occur, as described above. Recreational target shooters walking through occupied habitat to set up or place targets could crush or injure individual special status

plants. Over the long term, lead toxicity from bullet fragment deposition and oxidization may result in decreased physiological function of special status plants. These impacts would be site specific, only occurring where recreational target shooting occurred in occupied special status plant habitat. The intensity and scale of impacts would be greater in areas of concentrated use.

Fire caused by recreational target shooting can likewise have direct and indirect effects on special status plants. Fire may directly injure or kill individual special status plants. As described above, fire can alter vegetation composition and result in long-term increases in invasive annual species and other ecological effects. If fire-burned habitat for special status plant species—including designated critical habitat for acuña cactus—reduced habitat suitability due to increased wildfire frequency and intensity and competition for soil nutrients and water, then increased invasive annual cover could result post fire (FR 81 55266-55313). If fire suppression activities occurred in occupied special status plant habitat, individual plants could be crushed or mechanically damaged by these activities.

Effects Common to All Alternatives

Under all alternatives, the BLM would implement monitoring and monitoring strategies, which would reduce the potential for and intensity of effects on vegetation resources as described in the *Nature and Type of Effects*. For Alternatives A through D, the BLM would mitigate or reduce impacts based on monitoring results. Examples include measures that temporarily restrict areas available for recreational target shooting or that allow recreational target shooting to continue while mitigating impacts. Implementing these strategies would reduce the potential for effects on vegetation resources by increasing awareness and/or oversight of the issue or by focusing use in areas more suitable for recreational target shooting while maintaining or improving resource values.

Mitigation that results in temporary or permanent restrictions on recreational target shooting would be expected to result in short- and long-term reductions, respectively, in impacts on vegetation resources associated with recreational target shooting. Under Alternative E, monitoring would help ensure the proposed restriction of the SDNM to recreational target shooting would be enforced and the potential for impacts on vegetation resources associated with recreational target shooting would be reduced over the long term as visitors seeking recreational target shooting experiences would move to areas outside of the SDNM.

Under all alternatives, the BLM would continue to implement national, state, and local fire restrictions and bans on explosive targets, which would reduce the intensity of effects on vegetation resources arising from recreational target shooting-caused fires. See **Section 4.2.7**, Wildfire Management, for a discussion of fire restrictions.

Table 4-13, below, summarizes the approximate acres of vegetation communities and miles of desert washes in the decision area that would be located in areas available to recreational target shooting under each alternative.

Table 4-13
Vegetation Communities Overlapping Target Shooting Allocations by Alternative

Vegetation Community[1]	Acres or Miles Available (top) and Restricted (bottom) by Alternative				
	A	B	C	D	E
Creosote Bush-Bursage	176,000 0	167,700 8,300	134,500 41,500	76,900 99,100	0 176,000
Palo Verde/Mixed Cacti	303,200 0	301,400 1,800	292,100 11,100	84,400 218,800	0 303,200
Sonoran Mid-Elevation Desert Scrub (Woodlands)	1,300 0	1,300 0	1,300 0	100 1,200	0 1,300
Desert Grassland	1,000 0	1,000 0	1,000 0	1,000 0	0 1,000
Desert Washes (Xeroriparian)	944 miles 0 miles	944 miles 0 miles	837 miles 107 miles	344 miles 600 miles	0 miles 944 miles

Source: BLM GIS 2016; Harris GIS 2005, SWReGAP GIS 2004; USGS 1:100,000 scale topographic quadrangles

[1]Desert washes are measured in miles, not acres. Vegetation community mapping is currently not available at a high enough resolution to distinguish desert wash communities from dominant vegetation communities surrounding them. Some plant communities are too small to be included in this list.

Alternative A

Under Alternative A, all areas in the SDNM would remain available for recreational target shooting, resulting in the greatest potential for changes in vegetation community or vegetation object condition or extent, changes in suitable or occupied special status plant habitat, changes in ecological conditions that support vegetation resources, and spread of nonnative invasive plant species as described in the *Nature and Type of Effects*. This is because the highest amount of recreational target shooting in the SDNM would occur under Alternative A. Impacts on vegetation resources from recreational target shooting would continue to be concentrated along the El Paso Natural Gas Company pipeline road, the SR 238 corridor, and the Vekol Valley Road.

Vegetation Communities

Under Alternative A, all acres of each vegetation community would be available to recreational target shooting, since no areas are restricted under this alternative. Therefore, the potential for impacts on vegetation communities, including direct impacts from mechanical damage and indirect impacts from recreational target shooting-caused fires as described under the *Nature and Type of Effects*, would be highest under this alternative. Impacts are expected to be moderate.

Special Status Plant Species

Under Alternative A, the potential for impacts on special status plant species is the highest of all alternatives, since recreational target shooting would continue to be available in all areas of SDNM. However, as discussed in **Chapter 3**, most special status plants occur in relatively remote, inaccessible portions of the SDNM, including the higher elevations of the Sand Tank and other mountains. Since recreational target shooting is most heavily concentrated and likely to occur in accessible locations near roads, direct impacts on special status plants under Alternative A are expected to be minor to negligible. An exception is for Tumamoc globeberry, which occurs at lower elevations in the Vekol Valley area of the SDNM. Since this species occurs in a more accessible location, the potential for impacts as described in the *Nature and Type of Effects* would be somewhat higher than for other special status plants, and impacts are expected to be minor to moderate.

Indirect impacts, as described in the *Nature and Type of Effects*, could occur if a fire ignited by recreational target shooting expanded into suitable habitat for special status plants. However, the chances of this happening are low, since this would require a continuous area of nonnative invasive plants that would allow wildfire to carry between recreational target shooting areas and special status plant habitat. Generally, such fuels are concentrated along roads and other accessible or disturbed areas in the SDNM. Seasonal fire restrictions and exploding target prohibitions would further reduce the potential for recreational target shooting to ignite fires that would expand into special status plant habitat. Therefore, such indirect impacts are expected to be minor to negligible.

Table 4-14, Acuña Cactus Critical Habitat Overlapping Target Shooting Allocations by Alternative, summarizes the acres of designated critical habitat for acuña cactus in the SDNM that would be located in areas available to recreational target shooting under each alternative. Since recreational target shooting is available in all areas of the SDNM under Alternative A, all critical habitat in the SDNM (1,400 acres) would likewise be located in areas available to recreational target shooting. However, critical habitat is located in the Sand Tank Mountains, a relatively remote and inaccessible location that is unlikely to see concentrated recreational target shooting use. Therefore, impacts on acuña cactus critical habitat under Alternative A are expected to be minor to negligible.

Table 4-14
Acuña Cactus Critical Habitat Overlapping Target Shooting Allocations by Alternative

Allocation	Alternative				
	A	B	C	D	E
Available	1,400	1,400	1,400	200	0
Restricted	0	0	0	1,200	1,400

Source: BLM GIS 2016

Monument Vegetation Objects

Under Alternative A, the potential for impacts on SDNM vegetation objects would be the highest of all alternatives since the entire SDNM would be available for recreational target shooting. Impacts on vegetation objects would occur if recreational target shooting resulted in changes in vegetation object condition or extent. Impacts on the saguaro forest vegetation object would occur if recreational target shooting damaged or killed saguaro cacti via mechanical damage, or if recreational target shooting-started fires resulted in saguaro cacti mortality as described in the *Nature and Type of Effects*. Saguaro cactus forests generally occur within the palo verde/mixed cacti community, 303,200 acres (100 percent) of which would continue to be available to recreational target shooting under Alternative A. Impacts are expected to be moderate.

Monument vegetation objects also include unique woodland assemblages and Sand Tank Mountains plant assemblages. As described in **Chapter 3**, these objects are generally restricted to higher elevation habitat in the Sand Tank, Javelina, Table Top, and Maricopa mountains in the SDNM. Since recreational target shooting is most heavily concentrated and likely to occur in accessible locations in the SDNM near roads, direct impacts on these vegetation objects under Alternative A are expected to be minor to negligible.

Indirect impacts could also occur if a fire ignited by recreational target shooting expanded into the Sand Tank Mountains or other higher elevation unique woodland assemblages. However, the chances of this happening are expected to be low as discussed under *Special Status Plants*. Seasonal fire restrictions and exploding target prohibitions would further reduce the potential for fire-related impacts. Therefore, such indirect impacts are expected to be minor to negligible.

Monument vegetation objects also include the acuña cactus and other vegetation communities. Impacts on these objects under Alternative A would be the same as described under *Vegetation Communities* and *Special Status Plant Species* for this alternative.

Monitoring and Mitigation

Since the entire decision area would continue to be available for recreational target shooting under Alternative A, there would be a high likelihood that the BLM would have to implement mitigation measures. Applying mitigation measures that do not restrict an area to recreational target shooting would likely reduce the intensity of changes to vegetation community and vegetation object condition and extent, reduce the potential for changes in ecological conditions that support vegetation resources, and reduce the potential for spread of nonnative, invasive plant species. Alternatively, mitigation measures that restrict recreational target shooting temporarily or permanently would remove the potential for these impacts in the short term and long term,

respectively, since recreational target shooting would not occur in restricted areas.

Alternative B

Under Alternative B, areas in the SDNM available for recreational target shooting would be slightly reduced relative to Alternative A. Restricted areas under Alternative B are the El Paso Natural Gas Company pipeline road, which sees concentrated recreational target shooting use. The SR 238 corridor and the Vekol Valley Road would remain available for recreational target shooting.

Vegetation Communities

As shown in **Table 4-13**, acres of vegetation communities and miles of desert washes in the decision area that would be located in areas available to recreational target shooting under Alternative B are similar to Alternative A. Approximately 8,300 acres (5 percent) and 1,800 acres (less than 1 percent) of the creosote bush-bursage and palo verde/mixed cacti vegetation communities, respectively, would be restricted to recreational target shooting under Alternative B. This suggests that impacts on these vegetation communities would only be reduced to a minor extent under Alternative B, but because the restricted area under Alternative B currently sees concentrated recreational target shooting use, impacts as described under the *Nature and Type of Effects* may actually be moderately reduced compared with Alternative A. Impacts are expected to be minor.

Special Status Plant Species

Under Alternative B, the potential for impacts on special status plant species would be the same as described for Alternative A. This is because areas supporting special status plants in the SDNM (i.e., the Sand Tank and other mountains and the Vekol Valley) would remain available to recreational target shooting under Alternative B. As shown in **Table 4-14**, all acuña cactus critical habitat in the decision area (1,400 acres) would likewise remain available to recreational target shooting under Alternative B, as under Alternative A.

Monument Vegetation Objects

Under Alternative B, approximately 8,300 acres (5 percent) and 1,800 acres (less than 1 percent) of the vegetation objects creosote bush-bursage and palo verde/mixed cacti, respectively, would be restricted to recreational target shooting. As described under *Vegetation Communities*, because the restricted areas under Alternative B currently see concentrated recreational target shooting use, impacts on vegetation objects located in the restricted areas may be reduced compared with Alternative A despite the relatively small area restricted. This would be especially true if saguaro cactus forests occurred within the palo verde/mixed cacti community in the restricted areas. Impacts are expected to be minor.

For other vegetation objects, impacts would be as described under Alternative A. This is because remaining vegetation objects in the SDNM (i.e., acres of other

vegetation communities, the Sand Tank and other mountains, and the Vekol Valley area) would remain available to recreational target shooting under Alternative B, as under Alternative A.

Monitoring and Mitigation

Under Alternative B, approximately 2 percent less of the decision area would be available for recreational target shooting compared with Alternative A. Because nearly the same acreage would be available for recreational target shooting, there would likely be the same amount of recreational target shooting compared with Alternative A, resulting in the same potential need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a slightly smaller area under Alternative B. However, the majority of the SDNM would remain available to recreational target shooting, including other areas where impacts on vegetation resources from recreational target shooting are concentrated, like the SR 238 corridor and the Vekol Valley Road. Therefore, the need to implement vegetation mitigation measures would only be slightly reduced compared with Alternative A.

Alternative C

Under Alternative C, the Desert Back Country RMZ would be available for recreational target shooting. This would restrict approximately 52,800 acres compared with Alternative A, including portions of the El Paso Natural Gas Company pipeline road and SR 238 corridor.

Vegetation Communities

As shown in **Table 4-13**, acres of some vegetation communities and miles of desert washes in the decision area that would be located in areas available to recreational target shooting under Alternative C would be reduced relative to Alternative A. Approximately 41,500 acres (24 percent) of the creosote bush-bursage community, 11,100 acres (4 percent) of the palo verde/mixed cacti community, and 107 miles (11 percent) of the desert wash community would be restricted to recreational target shooting under Alternative C. Also, restrictions under Alternative C include portions of areas where recreational target shooting use is concentrated. Therefore, impacts on these vegetation communities as described under the *Nature and Type of Effects* would be reduced compared with Alternative A. Impacts are expected to be minor.

Special Status Plant Species

Under Alternative C, the potential for impacts on special status plant species would be the same as described for Alternative A. This is because areas supporting special status plants in the SDNM (i.e., the Sand Tank and other mountains and the Vekol Valley) would remain available to recreational target shooting under Alternative C, as under Alternative A. As shown in **Table 4-14**, all acuña cactus critical habitat in the decision area (1,400 acres) would likewise

remain in areas available to recreational target shooting under Alternative C, the same as under Alternative A.

Monument Vegetation Objects

Under Alternative C, 41,500 acres (24 percent) of the creosote bush-bursage, 11,100 acres (4 percent) of the palo verde/mixed cacti, and 107 miles (11 percent) of the desert wash vegetation objects would be restricted to recreational target shooting. As described under *Vegetation Communities*, impacts on vegetation located in the restricted areas would be reduced compared with Alternative A, both due to the total area of restrictions and the location in areas where recreational target shooting use is concentrated. Impacts are expected to be minor.

For other vegetation objects, impacts would be as described under Alternative A. This is because remaining vegetation objects in the SDNM (i.e., acres of other vegetation communities, the Sand Tank and most other mountains, and the Vekol Valley area) would remain available to recreational target shooting under Alternative C, as under Alternative A.

Monitoring and Mitigation

Under Alternative C, approximately 11 percent less of the decision area would be available for recreational target shooting compared with Alternative A. Because less of the decision area would be available for recreational target shooting, there would likely be less recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative C. However, portions of the SDNM would remain available to recreational target shooting, including areas where impacts on vegetation resources from recreational target shooting are concentrated, such as portions of the SR 238 corridor and the Vekol Valley Road. Therefore, the need to implement vegetation mitigation measures would only be somewhat reduced compared with Alternative A.

Alternative D

Under Alternative D, areas in the decision area available for recreational target shooting would be reduced by approximately 319,900 acres relative to Alternative A, due to restrictions within designated wilderness, lands managed to protect wilderness characteristics, and the Juan Bautista de Anza NHT RMZ. Restrictions would also include portions of the El Paso Natural Gas Company pipeline road and the SR 238 corridor.

Vegetation Communities

As shown in **Table 4-13**, acres of most vegetation communities and miles of desert washes in the decision area that would be located in areas available to recreational target shooting under Alternative D would be greatly reduced relative to Alternative A. Approximately 99,100 acres (56 percent) of the creosote bush-bursage community, 218,800 acres (72 percent) of the palo

verde/mixed cacti community, 1,200 acres (92 percent) of mid-elevation desert scrub, and 600 miles (64 percent) of the desert wash community would be restricted to recreational target shooting under Alternative D. Also, restrictions under Alternative D include portions of areas where recreational target shooting use is concentrated. Compared with Alternative A, Alternative D would result in moderate to major reductions in impacts on these vegetation communities, as described under the *Nature and Type of Effects*. Impacts are expected to be negligible to minor.

Special Status Plant Species

Under Alternative D, the potential for impacts on special status plant species would be reduced compared with Alternative A. This is because most areas supporting special status plants in the SDNM (i.e., the Sand Tank and other mountains) would be restricted for recreational target shooting under Alternative D. Impacts are expected to be minor. An exception is for Tumamoc globeberry, which occurs at lower elevations in the Vekol Valley area of the SDNM. This area would remain available to recreational target shooting under Alternative D; impacts on this species would be the same as described under Alternative A.

As shown in **Table 4-14**, approximately 1,200 acres (86 percent) of acuña cactus critical habitat in the decision area would be located in areas restricted to recreational target shooting under Alternative D. This represents an 86 percent decrease in critical habitat available for recreational target shooting compared with Alternative A. Impacts as described in the *Nature and Type of Effects* would be correspondingly reduced. Impacts are expected to be negligible.

Monument Vegetation Objects

Under Alternative D, 99,100 acres (56 percent) of the creosote bush-bursage, 218,800 acres (72 percent) of the palo verde/mixed cacti, 1,200 acres (92 percent) of mid-elevation desert scrub, and 600 miles (64 percent) of the desert wash vegetation objects would be restricted for recreational target shooting. As described under *Vegetation Communities*, Alternative D would result in moderate to major reductions in impacts on vegetation objects located in the restricted areas compared with Alternative A both due to the total area of restrictions and the location in areas where recreational target shooting use is concentrated. Impacts are expected to be minor. Impacts on the desert grassland object would be the same as described under Alternative A.

Impacts on other vegetation objects would be similarly reduced compared with Alternative A. These include impacts on unique woodland assemblages and the Sand Tank plant assemblages, which generally occur at higher elevations in the Sand Tank and other mountain areas. Restricted areas for recreational target shooting under Alternative D are the North and South Maricopa Mountains Wilderness areas, the Table Top Wilderness, and the Sand Tanks and Javelina Mountains, all of which support these vegetation objects.

Under Alternative D, impacts on acuña cactus, a Monument object, would be reduced compared with Alternative A, as described under *Special Status Plant Species*.

Monitoring and Mitigation

Under Alternative D, approximately 66 percent less of the decision area would be available for recreational target shooting compared with Alternative A. Because less of the decision area would be available for recreational target shooting, there would likely be less recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative D. However, portions of the SDNM would remain available to recreational target shooting, including areas where impacts on vegetation resources from recreational target shooting are concentrated, such as portions of the El Paso Natural Gas Company pipeline road, the SR 238 corridor, and the Vekol Valley Road. Therefore, the need to implement vegetation mitigation measures would only be somewhat reduced compared with Alternative A.

Alternative E

Under Alternative E, all areas in the SDNM would be restricted for recreational target shooting.

Vegetation Communities

As shown in **Table 4-13**, all acres of vegetation communities (and miles of desert washes) in the decision area would be located in areas restricted for recreational target shooting under Alternative E. Compared with Alternative A, Alternative E would result in major reductions in impacts on vegetation communities, as described under the *Nature and Type of Effects*. Impacts are expected to be negligible.

Special Status Plant Species

Under Alternative E, the potential for impacts on special status plant species would be reduced compared with Alternative A. This is because all areas supporting special status plants in the SDNM and all acuña cactus critical habitat would be restricted for recreational target shooting under Alternative E. Impacts are expected to be negligible.

Monument Vegetation Objects

Under Alternative E, all Monument vegetation objects would be located in areas restricted for recreational target shooting, because the entire SDNM would be restricted for recreational target shooting. Impacts, as described in the *Nature and Type of Effects*, would be reduced compared with Alternative A. Impacts are expected to be negligible.

Monitoring and Mitigation

Under alternative E, monitoring would help ensure the proposed restriction of the SDNM for recreational target shooting would be enforced and the potential for impacts on vegetation would be eliminated.

4.2.6 Water Resources

This section discusses impacts on water resources from the proposed alternatives in **Chapter 2**. Existing conditions are described in **Section 3.2.6**, Water Resources. The region of influence for analyzing impacts on water resources is the planning area.

Methods of Analysis

Impacts were determined by assessing which actions, if any, would change the quality or physical characteristics of water resources. Some impacts are direct, while others are indirect and affect water resources through a change in another resource. Direct impacts on water resources are, for example, those from contamination of surface water. Indirect impacts are those that occur later in time or farther removed in distance, such as soil erosion that increases the potential for sedimentation into streams.

Indicators of impacts on water resources include the following:

- Acres of BLM-administered land available to recreational target shooting
- Miles of ephemeral/intermittent surface waters on BLM-administered land available to recreational target shooting

The analysis includes the following assumptions:

- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including proximity to drainages, location in the watershed, time and degree of disturbance, reclamation potential of the affected area, vegetation, precipitation, and mitigating actions applied to the disturbance
- There are no sources of permanent surface water on BLM-administered land available to recreational target shooting
- Recreational target shooting would not change water supply or distribution, or alter groundwater
- Recreational target shooting would not occur in floodplains and riparian areas

Nature and Type of Effects

Erosion and Sedimentation

Surface-disturbing activities or structural improvements, such as fences or facilities, can remove essential soil-stabilizing agents. Examples of these agents are vegetation, soil crusts, litter, and woody debris. These soil features function as living mulch by retaining soil moisture and discouraging annual weed growth (Belnap et al. 2001). Loss of one or more of these agents increases potential erosion and resulting sediment transport to water bodies, leading to increased turbidity and water quality degradation. The impacts can be short-term or long-term, depending on the type, frequency, and intensity of disturbance, the area disturbed, and the time it takes for soil-stabilizing agents to become reestablished.

Surface-disturbing activities that disturb sensitive soils further reduce the soils' resistance to erosion and sedimentation in the short and long term; this is because sensitive soils can take decades to recover.

Surface-disturbing activities that repeatedly disturb or alter the soil, such as the congregation of recreational activities, can compact soil, which decreases infiltration rates and elevates the potential for increased overland flow. Surface-disturbing activities can also remove vegetation completely or reduce the health and vigor of vegetation, thereby increasing overland flow because plants would no longer be able or present to absorb water. This higher flow velocity can increase erosion and sediment delivery potential to area water bodies.

Sedimentation can impact water quality and the physical characteristics of streams (Behnke 1979). Sediment loading would lead to increased turbidity, lower dissolved oxygen, and increased temperatures in waterways, thereby reducing water quality. This higher flow velocity can also result in more water entering surface waters that is capable of influencing water quality. In addition, reducing vegetation cover may lead to higher water temperatures (Marlow and Pogacnik 1985). The impacts can be short- or long-term, depending on the type, frequency, and intensity of disturbance; area disturbed; and the time it takes for plant communities to become reestablished.

Surface-disturbing activities carry more erosion risks in areas of low reclamation potential and sensitive areas, such as stream channels, floodplains, and riparian habitats. Examples of low reclamation potential are soils with severe wind erosion susceptibility, severe or very severe water erosion susceptibility, or soils on rock outcrops. Soil erosion can also vary by slope, with the steeper slope resulting in higher rates of erosion. Disturbance in all of these areas creates greater potential for erosion and sediment delivery to surface waters, thereby degrading water quality.

Surface-disturbing activities within stream channels, floodplains, and riparian habitats are more likely to alter natural stability and floodplain function.

Destabilization and loss of floodplain function accelerate stream channel and bank erosion, increase sediment supply, dewater near-stream deposits, and cause fish and riparian habitat loss and water quality deterioration (Rosgen 1996). Altering or removing riparian habitats can reduce the hydraulic roughness of the bank and increase flow velocities near the bank (National Research Council 2002). Increased flow velocities can accelerate erosion, thereby decreasing water quality.

Contamination

Recreational target shooting involves the use of ammunition and materials that remain in the environment. These materials can contaminate surface water directly if deposited into a water body, leading to diminished water quality. These materials may also be washed into intermittent and ephemeral surface water features through overland flow, indirectly impacting water quality. These impacts can be short-term or long-term, depending on season of use, type of use, and intensity of use.

Authorized Uses

Management that affects the location of recreational target shooting can affect the intensity of impacts on water resources. Fencing off areas or erecting signs confines impacts to certain areas and reduces impacts outside the area. This technique can be used to reduce impacts on water resources.

The timing of recreational target shooting also affects the intensity of impacts. Implementing season of use for certain areas may reduce impacts during periods when soils may be more highly erodible or compactable.

Effects Common to All Alternatives

Under all alternatives, the BLM would implement mitigation and monitoring, which would reduce the potential for and intensity of impacts on surface water as described in the *Nature and Type of Effects*. For Alternatives A through D, the BLM would implement strategies to mitigate or reduce impacts on surface water involving erosion, sedimentation, and contamination based on monitoring results. Examples of mitigation measures that do not restrict an area to recreational target shooting include regulating the timing and duration of recreational target shooting. This would be done to allow recreational target shooting to still occur, but in places and at times of the year or season that result in minimal impacts on surface water.

Mitigation that results in temporary or permanent restrictions on recreational target shooting would be expected to result in short- or long-term reductions, respectively, in impacts on intermittent or ephemeral surface water associated with recreational target shooting. Mitigation measures that restrict recreational target shooting temporarily or permanently would have a greater influence on surface water than applying mitigation measures that do not restrict an area to recreational target shooting, because surface disturbances and the use of ammunition and materials that remain in the environment during recreational

target shooting would not occur in areas restricted to recreational target shooting. Under Alternative E, monitoring would help ensure the proposed restriction of the SDNM to recreational target shooting would be enforced and the potential for impacts on surface water involving erosion, sedimentation, and contamination would be reduced as visitors seeking recreational target shooting experiences would move to areas outside of the SDNM.

Alternative A

There are 23 miles of intermittent streams and 4,565 miles of ephemeral streams in the decision area (NHD GIS 2016). **Table 4-15**, Recreational Target Shooting Availability and Streams – Alternative A, shows the miles of streams with respect to recreational target shooting availability for Alternative A.

Table 4-15
Recreational Target Shooting Availability and Streams– Alternative A

Stream Type	Stream Length (miles)	Percent of Stream Type
Target Shooting Available		
Intermittent	23	100
Ephemeral	4,565	100

Source: BLM GIS 2016, NHD GIS 2016

Alternative A would continue to have no restrictions with respect to recreational target shooting within the entire decision area (486,400 acres). Consequently, all intermittent and ephemeral streams would continue to be in areas where recreational target shooting can occur. There would be no change in ongoing minor to moderate impacts (described above under *Nature and Type of Effects*) on miles of ephemeral and intermittent surface waters on BLM-administered land available to recreational target shooting.

Since the entire decision area would be available for recreational target shooting under Alternative A, there would be a high likelihood that the BLM would have to implement mitigation measures. Applying mitigation measures that do not restrict an area to recreational target shooting would result in reducing opportunities for recreational target shooting to increase erosion, sedimentation, and contamination of surface water. Mitigation measures that restrict recreational target shooting temporarily or permanently would result in ceasing opportunities for recreational target shooting to increase erosion, sedimentation, and contamination of surface water. Mitigation measures that restrict recreational target shooting temporarily or permanently would have a greater influence on surface water than applying mitigation measures that do not restrict an area to recreational target shooting, because surface disturbances and the use of ammunition and materials that remain in the environment during recreational target shooting would not occur in areas restricted to recreational target shooting.

Alternative B

There are 23 miles of intermittent streams and 4,565 miles of ephemeral streams in the decision area (NHD GIS 2016). **Table 4-16**, Recreational Target Shooting Availability and Streams – Alternative B, shows the miles of streams with respect to recreational target shooting availability for Alternative B.

Table 4-16
Recreational Target Shooting Availability and Streams– Alternative B

Stream Type	Stream Length (miles)	Percent of Stream Type
Target Shooting Available		
Intermittent	23	100
Ephemeral	4,413	97
Target Shooting Restricted		
Intermittent	0	0
Ephemeral	152	3

Source: BLM GIS 2016, NHD GIS 2016

Under Alternative B, the area that is temporarily restricted under the 2015 court order (approximately 10,100 acres in the decision area) would become permanently restricted to recreational target shooting. Consequently, all but 152 miles of ephemeral streams would continue to be in areas where recreational target shooting could occur. Compared with Alternative A, there would be no change in ongoing minor to moderate impacts (described above under *Nature and Type of Effects*) on all but 152 miles of ephemeral surface waters on BLM-administered land available to recreational target shooting.

For the 152 miles of ephemeral surface waters on BLM-administered land restricted to recreational target shooting, the impacts on ephemeral surface waters from recreational target shooting would cease. It is important to note, however, that other activities in the area restricted to recreational target shooting may become more prevalent if recreational target shooting is restricted. The other activities would have their own impacts on water resources, depending on the timing, duration, and location of the activities and the types of activities.

Because 3 percent of ephemeral streams would be restricted for recreational target shooting, there would be no need to implement additional mitigation measures in these areas in order to reduce impacts on surface water involving erosion, sedimentation, and contamination. Impacts after applying mitigation measures would be as described for Alternative A, but they would affect a slightly smaller area under Alternative B.

Alternative C

There are 23 miles of intermittent streams and 4,565 miles of ephemeral streams in the decision area (NHD GIS 2016). **Table 4-17**, Recreational Target Shooting Availability and Streams – Alternative C, shows the miles of streams with respect to recreational target shooting availability for Alternative C.

Table 4-17
Recreational Target Shooting Availability and Streams– Alternative C

Stream Type	Stream Length (miles)	Percent of Stream Type
Target Shooting Available		
Intermittent	21	91
Ephemeral	3,555	78
Target Shooting Restricted		
Intermittent	2	9
Ephemeral	1,009	22

Source: BLM GIS 2016, NHD GIS 2016

Under Alternative C, recreational target shooting would be available in the Desert Back Country RMZ (approximately 433,600 acres and restricted in the Juan Bautista de Anza NHT RMZ (approximately 52,800 acres), which contains the Butterfield Pass Trail, the Mormon Battalion Trail, and the Juan Bautista de Anza NHT. Consequently, all but 2 miles of intermittent streams and 1,009 miles of ephemeral streams would continue to be in areas where recreational target shooting could occur. Compared with Alternative A, there would be no change in ongoing minor to moderate impacts (described above under *Nature and Type of Effects*) on all but 1,012 miles of intermittent or ephemeral surface waters on BLM-administered land available to recreational target shooting.

For the 1,012 miles of intermittent or ephemeral surface waters on BLM-administered land restricted to recreational target shooting, the impacts on surface waters from recreational target shooting would cease. It is important to note, however, that other activities in the area restricted to recreational target shooting may become more prevalent if recreational target shooting is restricted. The other activities would have their own impacts on water resources, depending on the timing, duration, and location of the activities and the types of activities.

Because 9 percent of intermittent streams and 22 percent of ephemeral streams would be restricted for recreational target shooting, there would be no need to implement additional mitigation measures in these areas in order to reduce impacts on surface water involving erosion, sedimentation, and contamination. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative C.

Alternative D

There are 23 miles of intermittent streams and 4,565 miles of ephemeral streams in the decision area (NHD GIS 2016). **Table 4-18**, Recreational Target Shooting Availability and Streams – Alternative D, shows the miles of streams with respect to recreational target shooting availability for Alternative D.

Table 4-18
Recreational Target Shooting Availability and Streams– Alternative D

Stream Type	Stream Length (miles)	Percent of Stream Type
Target Shooting Available		
Intermittent	13	58
Ephemeral	2,185	48
Target Shooting Restricted		
Intermittent	10	42
Ephemeral	2,379	52

Source: BLM GIS 2016, NHD GIS 2016

Under Alternative D, the Juan Bautista de Anza NHT RMZ, three designated wilderness units, and lands managed to protect wilderness characteristics would be restricted to recreational target shooting (approximately 319,900 acres). Approximately 159,100 acres of designated wilderness along with approximately 108,100 acres of area managed for wilderness character within the decision area would be restricted to this activity, providing protection for wilderness attributes. In addition, recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ (approximately 52,800 acres), which contains the Butterfield Pass Trail, the Mormon Battalion Trail, and the Juan Bautista de Anza NHT. Consequently, all but 10 miles of intermittent streams and 2,379 miles of ephemeral streams would continue to be in areas where recreational target shooting could occur. Compared with Alternative A, there would be no change in ongoing minor to moderate impacts (described above under *Nature and Type of Effects*) on all but 2,389 miles of intermittent or ephemeral surface waters on BLM-administered land available to recreational target shooting.

For the 2,389 miles of intermittent or ephemeral surface waters on BLM-administered land restricted to recreational target shooting, the impacts on surface waters from recreational target shooting would cease. It is important to note, however, that other activities in the area restricted to recreational target shooting may become more prevalent if recreational target shooting is restricted. The other activities would have their own impacts on water resources, depending on the timing, duration, and location of the activities and the types of activities.

Because 42 percent of intermittent streams and 52 percent of ephemeral streams would be restricted for recreational target shooting, there would be no

need to implement additional mitigation measures in these areas in order to reduce impacts on surface water involving erosion, sedimentation, and contamination. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative D.

Alternative E

There are 23 miles of intermittent streams and 4,565 miles of ephemeral streams in the decision area (NHD GIS 2016). **Table 4-19**, Recreational Target Shooting Availability and Streams – Alternative E, shows the miles of streams with respect to recreational target shooting availability for Alternative E.

Table 4-19
Recreational Target Shooting Availability and Streams– Alternative E

Stream Type	Stream Length (miles)	Percent of Stream Type
Target Shooting Restricted		
Intermittent	23	100
Ephemeral	4,565	100

Source: NHD GIS 2016

Under Alternative E, recreational target shooting would be restricted in the entire decision area (approximately 486,400 acres). Consequently, all intermittent and ephemeral streams would be in areas where recreational target shooting is restricted. Compared with Alternative A, the impacts (described above under *Nature and Type of Effects*) on all intermittent or ephemeral surface waters on BLM-administered land from recreational target shooting would cease. It is important to note, however, that other activities in the SDNM may become more prevalent if recreational target shooting is restricted. The other activities would have their own impacts on water resources, depending on the timing, duration, and location of the activities and the types of activities.

Under alternative E, monitoring would help ensure the proposed restriction of the SDNM for recreational target shooting would be enforced and the potential for impacts on water resources would be eliminated.

4.2.7 Lands with Wilderness Characteristics

This section discusses impacts on lands managed to protect wilderness characteristics and lands found to possess wilderness characteristics from the proposed alternatives in **Chapter 2**, Existing conditions are described in **Section 3.2.7**, Lands Managed to Protect Wilderness Characteristics.

Methods of Analysis

Lands managed to protect wilderness characteristics were considered in the land use planning process under BLM Manual 6320–Considering Lands with

Wilderness Characteristics in the BLM Land Use Planning Process (BLM 2012c). Impacts on wilderness characteristics result from actions that maintain, enhance, or diminish the amount, distribution, and quality of the wilderness characteristics resource indicators.

Lands found to possess wilderness characteristics are those lands with wilderness characteristics where protection of wilderness characteristics is not prioritized over other multiple uses. In lands managed to protect wilderness characteristics, the protection of wilderness characteristics is a priority over other multiple uses.

Indicators of impacts on lands managed to protect wilderness characteristics or lands found to possess wilderness characteristics include the following:

- Roadless areas of sufficient size
- Naturalness (apparent naturalness, not ecological naturalness)—The extent, location, distribution, and quality of naturalness and natural conditions in the landscape. Naturalness is affected by surface-disturbing activities and associated human uses and developments. Impacts would result from development of facilities or other disturbances—such as ammunition cartridges or cases, targets, or any other materials used for recreational target shooting left on the landscape—that make the area appear less natural.
- Opportunities for solitude or a primitive and unconfined type of recreation—Opportunities for solitude are impacted by the sights and sounds of, or evidence of, other human beings and human activities. Impacts would result from increases in visitation or development of facilities. Opportunities for primitive and unconfined recreation are affected by the presence of motorized activities and the availability, or unavailability, of landscapes conducive for such activities.
- Supplemental values—Impacts would result from any action that degrades the inventoried values

The analysis includes the following assumptions:

- Use and development of BLM-administered lands will increase into the foreseeable future
- All guidelines for the maintenance of wilderness characteristics as identified in this document would be followed to the extent allowed by existing budget and available personnel
- Any new surface-disturbing activities proposed would be subject to NEPA analysis. Proposed activities that would not initially meet

wilderness characteristic objectives for the area would be mitigated to the extent needed to meet the objectives.

- Uses and activities occurring both inside and outside these lands could influence wilderness characteristics, though outside influences would generally be indirect
- Any proposed action within an area managed to protect wilderness characteristics would be processed in accordance with the policies stated in BLM Manual 6320 (BLM 2012c)

Nature and Type of Effects

Wilderness characteristics are primarily influenced by actions that impact the undeveloped nature of the area or activities that increase the sights and sounds of other visitors. Generally, actions that create surface disturbance degrade the natural characteristics of lands managed to protect wilderness characteristics or lands found to possess wilderness characteristics, as well as the setting for experiences of solitude or a primitive and unconfined type of recreation.

Activities and allowable uses that could impact an area's natural appearance include: increasing the number of acres available for recreational target shooting, the presence or absence of roads and trails, use of motorized vehicles along those roads and trails, fences and other improvements, or other actions that result in or preclude surface-disturbing activities. All of these activities affect the presence or absence of human activity and, therefore, could affect an area's natural appearance. Prohibiting surface-disturbing activities and new developments within lands managed to protect wilderness characteristics or lands found to possess wilderness characteristics would protect an area's apparent naturalness.

Two other wilderness characteristics—outstanding opportunities for solitude or a primitive and unconfined type of recreation—are related to the human experience in an area. Visitors can have outstanding opportunities for solitude or a primitive and unconfined type of recreation when the sights, sounds, and evidence of other people are rare or infrequent; where visitors can be isolated, alone, or secluded from others; where the use of the area is through nonmotorized or nonmechanized means; and where there are no or only minimally developed recreational facilities.

Effects Common to All Alternatives

Under all alternatives, lands managed to protect wilderness characteristics in the SDNM would continue to be managed with the same acreages as those that are summarized in **Table 4-20**, Lands Managed to Protect Wilderness Characteristics. No changes to the acreages in these roadless areas are being proposed under any alternative.

Table 4-20
Lands Managed to Protect Wilderness Characteristics

Area	Acres Managed to Protect Wilderness Characteristics
Javelina Mountains North	36,800
Javelina Mountains South	13,100
Sand Tanks East	19,600
Sand Tanks West	25,600
White Hills	13,000
Total	**108,100**

Source: BLM GIS 2016

Table 4-21, Lands Found to Possess Wilderness Characteristics, summarizes the total areas found to possess wilderness characteristics, but were not fully allocated to be managed to protect wilderness characteristics.

Table 4-21
Lands Found to Possess Wilderness Characteristics

Area	Acres
Butterfield Pass	9,600
Margies Peak	13,800
Sand Tanks East	52,600
Sand Tanks West	56,100
South Maricopa Mtns. Extension	9,500
White Hills	13,000
Total	**154,600**

Source: BLM GIS 2016

Allowable uses making areas available to dispersed recreational target shooting throughout the SDNM could contribute to a loss or impairment of naturalness, opportunities for solitude or a primitive and unconfined type of recreation, and supplemental values in the SDNM identified during wilderness characteristic inventories, which included:

- Scenic stands of saguaro cactus and a rich diversity, density, and distribution of other plants, including rare and uncommon species
- Pack rat middens, desert washes, wildlife habitat, and cultural resources

These impacts would mostly accrue along roads on the perimeter of lands managed to protect wilderness characteristics due to spent shells, targets, household waste, destroyed or damaged vegetation and rock outcrops, and the unavoidable sound of gunfire. The sound of gunfire potentially impacts the largest land area with effects on naturalness being highly localized. Sound effects

vary greatly based on distance and intensity and are influenced by the size and design of the firearm, terrain features, and weather.

Impacts on an area's naturalness would also occur from the increased risk of wildfire when visitors are participating in recreational target shooting activities. An inert projectile can cause ignitions due to the conversion of kinetic energy to thermal energy at impact with a solid object or target. The size and temperature of bullet fragments resulting from impact depends on the mechanical properties of their constituent materials. The exact temperature at which ignition could occur is unknown and depends on the fuel, fuel bed characteristics, and environmental conditions of an area (Forest Service 2013).

Temporary or permanent mitigation-related restrictions on recreational target shooting would enhance lands found to possess wilderness characteristics by reducing or eliminating any impacts described above.

Alternative A

Under Alternative A, recreational target shooting would continue to be available on all 486,400 acres of BLM-administered surface lands in the SDNM, including all 108,100 acres of lands managed to protect wilderness characteristics. Recreational target shooting would continue to be available on the 154,600 acres of lands found to possess wilderness characteristics. Since the entire decision area would be available for recreational target shooting under Alternative A, there would be a high likelihood that the BLM would have to implement mitigation measures. Applying mitigation measures that do not restrict an area to recreational target shooting would result in impacts on naturalness, an area's opportunity for solitude or a primitive and unconfined type of recreation, and supplemental values. Mitigation measures that restrict recreational target shooting temporarily or permanently would result in fewer impacts on lands managed to protect wilderness characteristics and lands found to possess wilderness characteristics. This alternative allows for the most acres to be available for recreational target shooting out of all alternatives, thus resulting in the most impacts on wilderness characteristics.

As described above under *Effects Common to All Alternatives,* impacts on an area's naturalness would mostly accrue along roads on the perimeter of lands managed to protect wilderness characteristics due to spent shells, targets, household waste, destroyed or damaged vegetation and rock outcrops, and the unavoidable sound of gunfire. These impacts are expected to be minor, site specific, and short term. Impacts on an area's naturalness would also occur from the increased risk of wildfire when visitors are participating in recreational target shooting activities due to possible ignitions. These impacts are expected to be minor, localized, and short- to long-term depending on the acreage burnt during a wildfire, and the types of vegetation burned (See **Section 4.2.7**, Wildfire Management). Wildfire can leave the ground surface scarred and devoid of vegetation in the short term, thereby directly changing the naturalness

of the landscape and, thus, wilderness characteristics. Indirect impacts over the long term could improve the naturalness if the BLM reestablishes native post fire in areas where invasive species were ubiquitous.

Impacts on an area's opportunity for solitude or a primitive and unconfined type of recreation would occur from recreational target shooting due to an increased human presence engaging in this activity. These impacts are expected to be minor, localized, and short term. The BLM suggests that recreational target shooting should only take place in areas well away from other concentrations of people and property, thus reducing impacts on opportunities for solitude.

Alternative B

Under Alternative B, recreational target shooting would be available on 476,300 acres of BLM-administered surface lands in the SDNM, including all 108,100 acres of lands managed to protect wilderness characteristics. Recreational target shooting would be available on 152,800 acres of lands found to possess wilderness characteristics. Impacts under Alternative B, including from implementation of mitigation measures, would be similar as those described under Alternative A due to the same acreages and areas being available to recreational target shooting on lands managed to protect wilderness characteristics. Impacts under Alternative B would be similar, but lesser in degree, as those described under Alternative A for lands found to possess wilderness characteristics, due to 1 percent fewer acres being available for recreational target shooting. This would result in less need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative C.

Alternative C

Under Alternative C, recreational target shooting would be available on 433,600 acres of BLM-administered surface lands in the SDNM, including all 108,100 acres of lands managed to protect wilderness characteristics. Recreational target shooting would be available on 145,000 acres of lands found to possess wilderness characteristics. Impacts under Alternative C would be the same as those described under Alternative A for lands being managed to protect wilderness characteristics due to the same acreages and areas being available to recreational target shooting. Impacts under Alternative C would be similar, but lesser in degree, as those described under Alternative A for lands found to possess wilderness characteristics, due to 6 percent fewer acres being available for recreational target shooting. This would result in less need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative C.

Alternative D

Under Alternative D, recreational target shooting would be available on 166,500 acres. It would be restricted on 319,900 acres of BLM-administered surface lands in the SDNM, including all 108,100 acres of lands managed to protect wilderness characteristics. Recreational target shooting would be restricted on 117,500 acres of lands found to possess wilderness characteristics. Restricting recreational target shooting on all lands managed to protect wilderness characteristics would result in minor impacts on wilderness characteristics compared with those described under Alternative A. Impacts on an area's apparent naturalness and opportunities for solitude or a primitive and unconfined type of recreation would occur under this alternative due to areas directly adjacent to lands managed to protect wilderness characteristics being available to recreational target shooting.

Impacts along the perimeter of lands managed to protect wilderness characteristics would include spent shells, targets, household waste, destroyed or damaged vegetation and rock outcrops, and the unavoidable sound of gunfire. These impacts are expected to be minor, site specific, and short term. Impacts under Alternative D would be similar, but lesser in degree, as those described under Alternative A for lands found to possess wilderness characteristics, due to 76 percent fewer acres being available for recreational target shooting. All impacts in these areas are expected to be minor. This would result in less need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative D.

Alternative E

Under Alternative E, recreational target shooting would be available on 0 acres. It would be restricted on all 486,400 acres of BLM-administered surface lands in the SDNM, including all 108,100 acres of lands managed to protect wilderness characteristics. Recreational target shooting would be restricted on 154,600 acres of lands found to possess wilderness characteristics. Impacts under Alternative E would be similar to those described under Alternative D due to the same acreages and areas being restricted to recreational target shooting on lands found to possess wilderness characteristics and lands managed to protect wilderness characteristics, except none of the lands within the SDNM adjacent to lands managed to protect wilderness characteristics would be available for recreational target shooting. Restricting all areas within and adjacent to lands with wilderness characteristics would provide the most protection to apparent naturalness and opportunities for solitude or a primitive and unconfined type of recreation, and supplemental values out of all the alternatives by making any impacts described under *Effects Common to All Alternatives* negligible under this alternative. Since the entire SDNM would be restricted to recreational target shooting, the BLM would not likely need to implement mitigation measures. Instead, monitoring would help ensure the proposed restriction of the SDNM to recreational target shooting would be enforced and the potential for impacts

on an area's naturalness and opportunities for solitude or a primitive and unconfined type of recreation would be reduced as visitors seeking recreational target shooting experiences would move to areas outside of the SDNM.

4.2.8 Wildfire Management

This section discusses impacts on wildfire management from the proposed alternatives in **Chapter 2**. Existing conditions are described in **Section 3.2.8**, Wildfire Management.

Impacts on fire and fuels management would vary by alternative based on the number of acres available for recreational target shooting on BLM-administered lands within the SDNM. Most wildfires within the SDNM are human-caused and are expected to increase as recreation demands increase on public lands as a result of population growth, especially from the metropolitan Phoenix area. Wildfire suppression responses are expected to increase in order to provide for public health and safety, protect infrastructure, and limit fire damage to important resource values.

Methods of Analysis

Indicators of impacts on wildfire management include the following:

- Fire frequency is measured by the change in the number of human-caused wildfires. This indicator measures the effectiveness of preventative management actions, such as education and restrictions on visitor travel and use. The number of human-caused starts is dependent upon the density of human use, public access, and developments within the SDNM.

Assumptions

The analysis includes the following assumptions:

- A direct relationship exists between the density of human use within the planning area and the frequency of human-ignited fires (and the intensity of use is expected to increase over time). Use restrictions limiting large areas available for recreational target shooting would reduce human visitation associated with recreational target shooting and lower the potential for human-caused fires.
- Based on seasonal conditions such as exceptionally wet winter and spring conditions that are sufficient to grow fine fuels, the potential for larger fires may increase due to the establishment and spread of nonnative grass species, such as red brome. An increase in invasive species may promote the spread and intensity of wildfire.
- A full suppression response would reduce the size of fires

- Strategically placed fuel treatments would reduce the size and severity of wildfires, serve to provide for firefighter and human health and safety, and protect important resource values
- Delineation or establishment of RMZs would increase public visitation within the RMZ, as visitor experiences would be enhanced for some

Nature and Type of Effects

Increases in public visitation and use of BLM-administered lands, including for recreational target shooting, increases the potential for human-caused fires.

Qualitative Intensity Scale

In terms of changes to a plant community, as described by Fire Regime Condition Class, a negligible or minor impact would result in no change to condition class (CC). Fire regime condition class 1 represents ecosystems with low (< 33 percent) departure from a defined reference period or landscapes still within the natural or historical range of variation. FRCC 2 indicates ecosystems with moderate (33 to 66 percent) departure from reference conditions; and FRCC 3 indicates ecosystems with high (> 66 percent) departure. A plant community currently in CC1 would remain in CC1 if it experienced a minor change. A moderate impact would be represented by a change in condition class from a CC1 to a CC2 or a change in a CC2 to a CC3. A major impact would be represented by a change in CC from the current condition class to a CC3. See Table 4-22, Qualitative Intensity Scale – Departure of Vegetation from Reference Conditions.

Table 4-22
Qualitative Intensity Scale – Departure of Vegetation from Reference Conditions

Fire Regime Condition Class (FRCC)	Percent Departure from Defined Reference Period	SDNM Acres of Vegetation by FRCC	SDNM Departure Acres Necessary for Change in Condition Class
1	< 33%	467,479	>154,268
2	33 – 66%	17,111	> 11,293
3	> 66%	0	NA

Source: Interagency Fire Regime Condition Class Guidebook, Version 3.0, September 2010

Effects Common to All Alternatives

Monitoring recreational target shooting would be common to all alternatives. Issuance of seasonal fire restriction orders prohibiting recreational target shooting would also be common to all alternatives. Issuance of seasonal fire restrictions would reduce the potential of human-caused wildfire during times of

high fire danger. For Alternatives A through D, the BLM would implement strategies to mitigate or reduce impacts from recreational target shooting based on monitoring results. Examples of include actions that temporarily restrict areas available to recreational target shooting or that allow recreational target shooting to continue while mitigating impacts (e.g., via signage). Implementation of these measures would reduce the potential for human-caused fire by focusing use to areas more suitable for recreational target shooting while maintaining or improving resource values. Examples include moving recreational target shooting to areas where there are fewer fuels or fewer resource values at risk. Under Alternative E, monitoring would help ensure the proposed restriction of the SDNM to recreational target shooting would be enforced and the potential for human-caused wildfire would be reduced as visitors seeking recreational target shooting experiences would move to areas outside of the SDNM.

Under all alternatives, based on trends discussed in **Section 3.2.8**, the risk of ignitions resulting from recreational target shooting would be negligible to minor. Seasonal prohibitions on recreational target shooting during dry years would further reduce this risk. The severity and size of any resulting wildland fires is difficult to predict and would be dependent upon precipitation and vegetation conditions. As discussed in Chapter 3, vegetation communities in the SDNM are unlikely to carry a fire over large areas.

Alternative A

Alternative A manages all areas—approximately 486,400 acres of BLM-administered lands within the SDNM—as available to recreational target shooting. This alternative has the highest potential for human-caused wildfires and the highest demand for fire suppression resources, as more people would be accessing areas for recreational target shooting and associated recreational activities. Direct impacts related to recreational target shooting include potential fire starts from bullets striking rocks, metal or other targets causing sparks and potential fire ignition. Indirect impacts include human-caused fire starts related to recreational target shooting activities, such as campfires and smoking.

Alternative A would have the highest potential for human-caused fires. However, as discussed under *Effects Common to All Alternatives*, this risk is negligible or minor based on past trends. Impacts on native vegetation communities not adapted to fire would be minor as wildfires within the planning area are generally small (less than 1 acre in size) due to sparse vegetation to carry wildfires. Potential impacts on vegetation communities would vary based on fire conditions and the degree of fuels loading. Impacts on vegetation communities are expected to remain minor with potential moderate impacts occurring in the unlikely event of a large wildfire exceeding 154,268 acres within condition class 1 vegetation areas or 11,293 acres within condition class 2 areas. Since the entire decision area (486,400 acres) would be available for recreational target shooting under Alternative A, there would be a high

likelihood for implementation of strategies and mitigation measures necessary to reduce the potential for wildfire ignitions. Impacts based on implementation of strategies and mitigation measures would be similar to those described under *Effects Common to All Alternatives.*

Implementation of aggressive full suppression operations would protect and reduce potential impacts on historical vegetation communities. Implementation of BLM national, state, and local fire restrictions provide short-term or seasonal fire restrictions, reducing the potential for human-caused fire ignitions during times of high fire danger (Fire Restrictions in Effect for Public Lands near Phoenix; BLM 2016d) and bans on explosive targets (Fire Prevention Order #AZ910-2015-001).

Alternative B

Compared with Alternative A, this alternative has the second-highest potential for human-caused fires. Approximately 476,300 acres would be available and 10,100 acres would be restricted to recreational target shooting. Potential direct and indirect impacts would be similar to those described under Alternative A, as 2 percent of the decision area would be restricted from recreational target shooting. Fire suppression priorities would be marginally lower compared with Alternative A, as recreational target shooting would shift from restricted areas to areas available to recreational target shooting (476,300 acres).

Implementation of monitoring and mitigation measures to reduce the potential for human-caused fire would also be similar to those under Alternative A. The El Paso natural gas line may not be as vulnerable to human-caused fire under this alternative, as proposed recreational target shooting restrictions would occur in this area limiting the potential for human caused fire. The potential impacts on historical vegetation communities would be similar to those under Alternative A and would be dependent on the number and size of wildfires and the degree of fuels loading as a result of establishment and spread of invasive species. Similar to Alternative A, this alternative would require more monitoring and mitigation in order to reduce the potential for human-caused fire.

Implementation of aggressive full suppression operations would protect and reduce potential wildfire impacts on historical vegetation communities. Implementation of BLM national, state, and local fire restrictions provide short-term or seasonal fire restrictions, reducing the potential for human-caused fire ignitions during times of high fire danger (Fire Restrictions in Effect for Public Lands near Phoenix; BLM 2016d) and bans on explosive targets (Fire Prevention Order #AZ910-2015-001).

Alternative C

Alternative C would make 433,600 acres available for recreational target shooting and restrict approximately 52,800 acres. Potential direct and indirect impacts would be similar to those described under Alternative A, as 11 percent

of the decision area would be restricted from recreational target shooting. The potential for human-caused fire from management of the Desert Back Country RMZ would be marginally lower, as management of the RMZ would restrict recreational target shooting, resulting in fewer visitors. The potential for human-caused fires and from activities associated with recreational target shooting would be reduced by 11 percent, as approximately 52,800 acres would be restricted to recreational target shooting as compared with Alternative A. However, RMZ management would encourage and increase other public recreational visitation, travel, and access to the area. Wildfire impacts on non-fire-adapted vegetation communities would be expected to be minor as wildfires within the planning area are generally small (less than 1 acre in size) due to sparse vegetation that limit wildfire spread. The potential for wildfire to impact historical vegetation fire regime condition classes would remain minor having 11 percent fewer acres available for recreational target shooting compared with Alternative A. However, the 433,600 acres available for recreational target shooting would be more vulnerable to human-caused fire as recreational target shooting use would concentrate use in these areas. As discussed under *Effects Common to All Alternatives*, this risk is negligible or minor based on past trends. As fewer acres (433,600 acres) would be available for recreational target shooting, this alternative would require implementation of fewer mitigation measures to reduce the potential for human-caused fire as compared with Alternative A.

Aggressive, full suppression operations would protect and reduce potential impacts as a result of wildfire. Implementation of BLM national, state, and local fire restrictions provide short-term or seasonal fire restrictions, reducing the potential for human-caused fire ignitions during times of high fire danger (Fire Restrictions in Effect for Public Lands near Phoenix; BLM 2016d) and bans on explosive targets (Fire Prevention Order #AZ910-2015-001).

Alternative D

Alternative D would make 166,500 available for recreational target shooting outside of designated wilderness areas and lands managed to protect wilderness characteristics, and it would restrict recreational target shooting by 319,900 (66 percent) acres within the decision area. The potential for human-caused fires and fuels loading from activities associated with recreational target shooting would be reduced by approximately 66 percent compared with Alternative A. Fire suppression would respond to fewer fires. Wildfire impacts on non-fire-adapted vegetation communities would be expected to be minor as wildfires within the planning area are generally small (less than 1 acre in size) due to sparse vegetation that limit wildfire spread. The potential for wildfire to impact historical vegetation fire regime condition classes would remain minor having 66 percent fewer acres available for recreational target shooting compared with Alternative A. The potential for wildfire on lands outside of wilderness areas and lands identified as with having wilderness characteristics would be higher due to concentrated recreational target shooting use. However, as discussed

under *Effects Common to All Alternatives*, this risk is negligible or minor based on past trends.

This alternative would require the fewest mitigation measures to reduce the potential for human-caused fire compared with Alternative A, as 166,500 acres would be available for recreational target shooting.

Implementation of aggressive, full suppression operations and strategic placement of fuel treatments would protect and reduce potential impacts on historical vegetation communities. Implementation of BLM national, state, and local fire restrictions provide short-term or seasonal fire restrictions, reducing the potential for human-caused fire ignitions during times of high fire danger (Fire Restrictions in Effect for Public Lands near Phoenix; BLM 2016d) and bans on explosive targets (Fire Prevention Order #AZ910-2015-001).

Alternative E

Alternative E would restrict recreational target shooting within the entire SDNM (486,400 acres). The potential for the lowest direct and indirect impacts from wildfire as a result of recreational target shooting would occur under this alternative. Fire suppression resources would respond to fewer human-caused fires compared with Alternative A. Wildfire impacts on non-fire-adapted vegetation communities would remain minor as wildfires within the planning area are generally small (less than 1 acre in size) due to sparse vegetation that limit wildfire spread. The potential for wildfire to impact historical vegetation fire regime condition classes would be negligible as potential for human caused fire from recreational target shooting would not occur compared with Alternative A. This alternative would not require implementation of mitigation measures related to target shooting.

Implementation of BLM national, state, and local fire restrictions would further provide short-term or seasonal fire restrictions, reducing the potential for human-caused fire ignitions during times of high fire danger (Fire Restrictions in Effect for Public Lands near Phoenix; BLM 2016d).

4.3 Resource Uses

4.3.1 Livestock Grazing

This section discusses impacts on livestock grazing from the proposed alternatives in **Chapter 2**. Existing conditions are described in **Section 3.3.1**, Livestock Grazing.

Methods of Analysis

Indicators used to quantitatively assess impacts on livestock grazing include the following:

- Reduction or increase of forage resources available to livestock grazing

The following assumptions regarding the future management of livestock grazing are made:

- All new and existing leases and permits would be subject to terms and conditions determined by the BLM Authorized Officer
- The construction and maintenance of existing range improvements would continue in the decision area as needed. Range improvements lead to better livestock distribution and management options, which would maintain or improve rangeland health.

Nature and Type of Effects

Impacts on livestock grazing are generally the result of activities that affect forage levels, season of use and timing, and the ability to construct range improvements, as well as anthropogenic disturbances or harassment of livestock in grazing allotments. Key types of impacts are detailed below. Impacts on livestock grazing could result in economic impacts on individuals and the community at large, both directly and indirectly, as detailed in **Section 4.5.3**, Social and Economic Conditions.

Recreational target shooting can affect livestock grazing directly through human disturbance and indirectly through rangeland degradation. Many of the conflicts surrounding the use of rangelands revolve around the impacts of urban development and related public land use (Holechek 2001; Brunson and Steel 1994). Disturbance can include unwanted animal dispersion or trespass due to gates left open by recreationists, displacement, harassment, or injury of animals, or damage to range improvements from recreational vehicles or recreational target shooting (Moran et al. 2007). Recreational target shooting may also remove forage resources. Additional indirect effects of recreational target shooting are the possible introduction of weed species and reduced forage availability.

The degree of impacts would vary with the intensity of recreational target shooting, the timing of recreational target shooting (livestock would be more susceptible to disturbance during the spring when young are present), and the location of recreational target shooting in the allotment (a higher level of disturbance would occur near areas frequented by livestock, such as water sources or supplemental mineral sites). Areas identified for recreational target shooting would increase these potential conflicts, and those areas identified as restricted to certain types of recreational target shooting would decrease the conflicts.

Effects Common to All Alternatives

Under all alternatives, impacts from recreational target shooting on livestock grazing would be as identified in *Nature and Types of Effects* and limited to perennial-ephemeral allotments available to grazing. Allotments or portions of

allotments unavailable to grazing would not be subject to impacts due to a lack of current or foreseeable grazing over the planning period.

As discussed in **Chapter 3**, the decision area includes allotments where grazing may occur year-round (perennial-ephemeral allotments) as well as allotments where grazing would be available only when sufficient rainfall and forage is available to support grazing (ephemeral allotments). Impacts would be intensified in allotments with perennial-ephemeral grazing due to the greater overlap of time when livestock are present in the allotment and recreational target shooting could also be occurring.

As discussed under **Chapter 2**, under all alternatives, new information may be gathered or land uses may change in a way that supports revision of management techniques or BMPs. One outcome of monitoring are mitigation measures that do not result in additional areas being restricted to recreational target shooting. Such measures could include increased educational efforts, regulatory signage, law enforcement presence, and/or physical remediation of impacts. Increased education, signage, or law enforcement would likely result in a reduction in conflicts between recreational target shooting and livestock grazing, particularly if it resulted in fewer gates left open and less unwanted dispersal of livestock and/or reduced disturbance of livestock from recreational activities. The effectiveness of such measures, however, is likely to vary on a site-specific basis and some level of impacts are likely to remain.

In contrast, implementation of mitigation measures that result in additional temporary or permanent restrictions on recreational target shooting would result in a reduction in all direct and indirect disturbance of livestock as discussed under Nature and Type of Effects to a negligible level. Elimination of impacts would be limited to the sites in which the restrictions were implemented. The exact location and type of mitigation measures employed for recreational target shooting would vary under Alternatives A through D, and the impacts are discussed below. Under Alternative E, monitoring would help ensure the proposed restriction of the SDNM for recreational target shooting would be enforced, and the potential for direct and indirect disturbance of livestock would be reduced as visitors seeking recreational target shooting experiences would move to areas outside of the SDNM.

Alternative A

Under Alternative A, the entire decision area would continue to be available to recreational target shooting, including 157,100 acres overlapping current grazing allotments with available grazing (see **Table 4-23**, Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative A). Of this amount, approximately 155,500 acres would overlap perennial-ephemeral allotments and 1,600 acres would overlap ephemeral allotments. All SDNM perennial-ephemeral and ephemeral allotments would be subject to potential disturbance

Table 4-23
Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative A

	Allotment Name	Acres Available to Recreational Target Shooting	Acres with Target Shooting Restricted
	SDNM (Perennial-Ephemeral)		
1	Beloat	33,600	0
2	Big Horn	75,200	0
3	Hazen	31,900	0
4	Lower Vekol	14,800	0
	Subtotal	*155,500*	*0*
	SDNM (Ephemeral Only)		
1	Arnold	1,600	0
	Subtotal	*1,600*	*0*
	Total	**157,100**	**0**

Source: BLM GIS 2016 and BLM 2012
There would be negligible impacts in the South Vekol, Table Top, Vekol, and Santa Rosa allotments due to the lack of available grazing per the 2001 Monument proclamation. The portion of Big Horn allotment where livestock grazing is unavailable would also experience negligible impacts (see discussion in Section 3.3.1, Livestock Grazing), although impacts could occur in the remainder of the allotment.

from recreational target shooting—as discussed under *Nature and Type of Impacts*—with direct impacts on livestock grazing, such as unwanted animal dispersion, harassment, injury of animals, or damage to range improvements, and indirect impacts such as removal of forage resources. Impacts would likely be concentrated in areas where recreational target shooting has occurred in the past, including along SR 238, overlapping portions of the Big Horn allotment, and along the El Paso Natural Gas company pipeline road, overlapping the northern section of the Haze, Arnold, and Beloat allotments.

Since the entire decision area would be available for recreational target shooting under Alternative A, there would be a high likelihood that the BLM would have to implement mitigation measures. Applying mitigation measures that do not restrict an area to recreational target shooting would result in some reduction in disturbance of livestock, with impacts varying at the site-specific level, as discussed under *Nature and Type of Effects*. Mitigation measures that restrict recreational target shooting temporarily or permanently would result in the reduction in disturbance to a negligible level wherever the mitigation measure was applied. Mitigation measures of some kind are more likely to occur in areas where recreational target shooting has historically occurred, as discussed above.

Alternative B

Under Alternative B, approximately 10,100 acres that currently have temporary restrictions on recreational target shooting would be permanently restricted from recreational target shooting. The restricted area overlaps 9,400 acres of

available grazing allotments, overlapping northern sections of Arnold, Beloat, and Hazen allotments along the El Paso Natural Gas Pipeline ROW. The remaining 147,700 acres with available grazing in the decision area would remain available (a 6 percent reduction from Alternative A; see **Table 4-24**, Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative B).

Table 4-24
Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative B

	Allotment Name	Acres Available to Recreational Target Shooting	Acres with Target Shooting Restricted
	SDNM (Perennial-Ephemeral)		
1	Beloat	27,200	6,400
2	Big Horn	75,200	0
4	Hazen	29,300	2,600
5	Lower Vekol	14,800	0
	Subtotal	*146,500*	*9,000*
	SDNM (Ephemeral Only)		
1	Arnold	1,200	400
	Subtotal	*1,200*	*400*
	Total	**147,700**	**9,400**

Source: BLM GIS 2016 and BLM 2012
Note that negligible impacts would occur in South Vekol, Table Top, Vekol, and Santa Rosa allotments due to a lack of available grazing per the 2001 Monument proclamation. The portion of Big Horn allotment where livestock grazing is unavailable would also have negligible impacts (see discussion in **Section 3.3.1**, Livestock Grazing), although impacts could occur in the remainder of the allotment.

The type of impacts from recreational target shooting on livestock grazing would be the same as discussed under *Nature and Type of Effects* in areas available to grazing. However, the level of impacts would be slightly reduced as compared with Alternative A due to the reduction in areas available to recreational target shooting. Making a portion of the decision area with a history of recreational target shooting restricted to recreational target shooting would reduce impacts in this area, but disturbance may be redirected to other portions of the decision area.

Under Alternative B, approximately 94 percent of the decision area with available grazing would remain available for recreational target shooting. Although the level of recreational target shooting may be somewhat reduced, the need to implement mitigation measures and impacts after applying these measures would be similar to Alternative A. The exact location of mitigation measures and the type of mitigation measures employed may vary from Alternative A due to making areas with historical conflicts unavailable to grazing.

Alternative C

Under Alternative C, recreational target shooting would remain available in the Desert Back Country Recreation Management Zone. Approximately 9,500 acres with available grazing would become restricted to recreational target shooting (within the Beloat allotment and the eastern portion of the Big Horn allotment) and 147,600 acres available to grazing would remain available to recreational target shooting (a 6 percent reduction from Alternative A; see **Table 4-25**, Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative C).

Table 4-25
Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative C

	Allotment Name	Acres Available to Recreational Target Shooting	Acres with Target Shooting Restricted
	SDNM (Perennial-Ephemeral)		
1	Beloat	26,500	7,100
2	Big Horn	72,800	2,400
4	Hazen	31,900	0
5	Lower Vekol	14,800	0
	Subtotal	*146,000*	*9,500*
	SDNM (Ephemeral Only)		
1	Arnold	1,600	0
	Subtotal	*1,600*	*0*
	Total	**147,600**	**9,500**

Source: BLM GIS 2016

There would be negligible impacts in the South Vekol, Table Top, Vekol, and Santa Rosa allotments due to the lack of available grazing per the 2001 Monument proclamation. The portion of Big Horn allotment where livestock grazing is unavailable would also experience negligible impacts (see discussion in **Section 3.3.1**, Livestock Grazing), although impacts could occur in the remainder of the allotment.

Because 94 percent of the decision area with available grazing would be available for recreational target shooting, there would likely be less recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative C.

Alternative D

Under Alternative D, recreational target shooting would remain available outside designated wilderness, lands managed to protect wilderness characteristics, and the Juan Bautista de Anza NHT RMZ. Approximately 103,500 acres in the decision area with available grazing would become restricted to recreational target shooting and 53,600 acres would remain available (a 66 percent reduction from Alternative A). Acres available to

recreational target shooting would include 52,000 acres in allotments available to perennial-ephemeral grazing and 1,600 acres available to ephemeral grazing (see **Table 4-26**, Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative D). The type of impacts from recreational shooting on livestock grazing would be the same as discussed under *Nature and Type of Effects* in areas available to grazing. However, the level of impacts would be reduced as compared with Alternative A due to a limited area available to recreational shooting.

Table 4-26
Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative D

Allotment Name		Acres Available to Recreational Target Shooting	Acres with Target Shooting Restricted
SDNM (Perennial-Ephemeral)			
1	Beloat	3,200	30,400
2	Big Horn	25,100	50,100
4	Hazen	14,900	17,000
5	Lower Vekol	8,800	6,000
	Subtotal	*52,000*	*103,500*
SDNM (Ephemeral Only)			
1	Arnold	1,600	0
	Subtotal	*1,600*	*0*
Total		**53,600**	**103,500**

Source: BLM GIS 2016
There would be negligible impacts in the South Vekol, Table Top, Vekol, and Santa Rosa allotments due to the lack of available grazing per the 2001 Monument proclamation. The portion of Big Horn allotment where livestock grazing is unavailable would also experience negligible impacts (see discussion in **Section 3.3.1**, Livestock Grazing), although impacts could occur in the remainder of the allotment.

Because only 34 percent of the decision area with available grazing would be available for recreational target shooting, there would likely be less recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Impacts after applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative D.

Alternative E

Under Alternative E, the entire SDNM would be restricted to recreational target shooting. As a result, impacts on livestock grazing from recreational target shooting as discussed under *Nature and Type of Effects* would be eliminated for all 157,100 acres with available grazing (**Table 4-27**, Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative E).

Table 4-27
Recreational Target Shooting Designations on Allotments Available to Grazing-Alternative E

	Allotment Name	Acres Available to Recreational Target Shooting	Acres with Target Shooting Restricted
	SDNM (Perennial-Ephemeral)		
1	Beloat	0	33,600
2	Big Horn	0	75,200
4	Hazen	0	31,900
5	Lower Vekol	0	14,800
	Subtotal	*0*	*155,500*
	SDNM (Ephemeral Only)		
1	Arnold	0	1,600
	Subtotal	*0*	*1,600*
	Total	**0**	**157,100**

Source: BLM GIS 2016
There would be negligible impacts in the South Vekol, Table Top, Vekol, and Santa Rosa allotments due to the lack of available grazing per the 2001 Monument proclamation. The portion of Big Horn allotment where livestock grazing is unavailable would also experience negligible impacts (see discussion in **Section 3.3.1**, Livestock Grazing), although impacts could occur in the remainder of the allotment.

Under Alternative E, monitoring would help ensure the proposed recreational target shooting restriction in the SDNM would be enforced and the potential for impacts on livestock grazing would be eliminated.

4.3.2 Recreation Management

This section discusses impacts on recreation management from the proposed alternatives in **Chapter 2**. Existing conditions are described in **Section 3.3.2**, Recreation Management.

Impacts on recreational target shooting opportunities and experiences are discussed in **Section 4.3.3**, Recreational Target Shooting.

Methods of Analysis

Indicators of impacts on recreation management include the following:

- Change in the quality of specific recreational opportunities resulting from a change in the recreation setting or potential recreational opportunities available for a particular type of activity
- Change in the quantity of specific recreational opportunities due to an increase or decrease in the number of facilities and amenities to support those opportunities
- Increase or decrease in the displacement of visitors engaged in specific activities

- In ERMAs, a decrease in the quality, quantity, or ability of users to engage in the principal recreational activities being managed for in the ERMA

The analysis includes the following assumptions:

- Overall visitation in the SDNM will continue to increase as the regional population grows. As visitation increases, there will be an increasing demand for recreation, including recreational OHV use, hiking, camping, and recreational target shooting.
- The potential for user interactions between all types of users will increase with increasing use, which may create risks to public health and safety
- Development and maintenance of improved facilities, such as recreational trails or campgrounds, will both promote and support increasing visitor use
- OHV use is limited to designated routes and trails
- The Sand Tank Mountains area of the SDNM commonly known as "Area A" is a Special Management Area. Before entering the area, anyone over the age of 18 is required to watch a safety video informing them about unexploded ordinance, illegal immigrants, illegal drug trafficking in the area, and the harsh desert environment. They then receive a "permit" at no charge verifying the viewing and are able to enter the area. Anyone under the age of 18 must be accompanied by a responsible adult. This approval process is expected to have a minimal impact on visitation and use in this area because it is simple to complete.

Nature and Type of Effects

Impacts on recreation activities are generally the result of conflicts between recreational uses, management related to other resources and resource uses, and stipulations placed on resource uses. These conflicts can affect the quality of recreational opportunities and decrease visitors' level of satisfaction with certain activities. The duration, frequency, and intensity of recreational activities influence the nature and type of impacts. For example, conflicts between those participating in recreational target shooting and those engaged in other recreational activities would increase as more users participate in each activity within the SDNM.

Management of recreation and other resources and uses increase or decrease the areas and facilities available for certain recreational activities. More areas available for certain activities, such as recreational target shooting, would provide more opportunities for visitors to engage in those activities. Restricting or closing areas or removing facilities would decrease the quantity of recreational opportunities associated with those areas and facilities.

Management of recreation and other resources and uses can result in the short- or long-term loss of choices in location for particular kinds of uses. Visitor displacement resulting from recreation management occurs when a recreational facility or management of a particular recreational use displaces visitors not wanting to participate in those activities. For example, developing a campground would displace visitors engaged in activities incompatible with camping. Where recreational target shooting is occurring, there would be a short-term impact on other recreational activities, because they would be displaced from the area. There would be moderate short-term impacts on recreation and visitor services if visitors are displaced from developed recreational areas.

Restricting areas for recreational target shooting minimizes safety risks, debris, and noise impacts on other recreational activities in those areas. These impacts would be greatest where recreational target shooting occurs near developed recreation sites (e.g., campgrounds, trails and trailheads, and parking areas) and in heavily visited areas. Short-term impacts include a decline in the quality of recreational experiences from noise and a reduced sense of safety. Over the long term, resource damage and the accumulation of ammunition and target debris could directly and indirectly diminish the quality of recreational experiences that value natural landscapes and viewsheds, including hiking, photography, and sightseeing.

Extensive Recreation Management Areas

In ERMAs, recreation management is in balance with the management of other resources and resource uses. Impacts could occur through changes to the principle recreational activities and associated qualities and conditions of the ERMA. Managing all or portions of ERMAs as available or restricted to recreational target shooting would impact the ERMA if recreational target shooting is not compatible with the principle recreational activities and conditions being managed for in the ERMA.

Effects Common to All Alternatives

Under all alternatives, the BLM would manage the entire SDNM as an ERMA, consistent with the 2012 RMP. Management would continue to focus on providing modest facilities, educational opportunities, and visitor information directed toward the objects for which the SDNM was designated. There would be opportunities for undeveloped, remote visitor experiences throughout the SDNM, particularly within the three designated wilderness areas. There would be more opportunities for developed recreation and interpretation at facilities, such as a campground, trailheads, trails, and an interpretive center, in the Juan Bautista de Anza NHT RMZ. The quantity of these backcountry and developed recreational opportunities would be the same across all alternatives.

Under all alternatives, the BLM would monitor the impacts from recreational target shooting and apply mitigation measures as appropriate. Monitoring and mitigation measures would maintain or improve the quality of recreation

activities by reducing or eliminating the types of impacts described in *Nature and Types of Effects*.

Alternative A

The BLM would continue to manage 100 percent (486,400 acres) of the decision area as available to recreational target shooting. As a result, noise and resource damage associated with recreational target shooting would continue to be in conflict with some of the principal recreational activities in the SDNM ERMA. In the short term, noise from recreational target shooting would disturb the remote character of the SDNM and could moderately decrease the BLM's ability to provide visitors with safe, high-quality recreation and educational experiences. In the long term, safety risks and resource damage would moderately diminish visitors' ability to learn about the Juan Bautista de Anza NHT and experience the natural history of the Sonoran Desert, two of the SDNM's principal objects. This is because safety risks may prompt some visitors to go elsewhere and resource damage may degrade the setting.

Juan Bautista de Anza NHT RMZ

In the Juan Bautista de Anza NHT RMZ (52,800 acres), there would continue to be the potential for minor or moderate direct and indirect, short- and long-term impacts from recreational target shooting on other dispersed and developed recreational activities. In the short-term, the experiences and opportunities of other users, such as hikers or campers, would be directly impacted by noise and safety concerns associated with recreational target shooting. Moderate direct, short-term impacts would most likely occur near developed recreation areas within the RMZ, particularly near trailheads and campgrounds, because these areas receive greater visitation. In these areas, noise and a reduced sense of safety as a result of recreational target shooting would reduce the quality of visitors' recreational experiences. There would be negligible impacts from noise on those engaged solely in recreational OHV use, because the noise associated with OHVs may make gunfire noise less noticeable.

If the BLM approves the SDNM Juan Bautista de Anza RMZ Recreation Plan (BLM 17 2016), motorized access would be allowed in the RMZ, including on routes directly adjacent to the trail. Noise, debris, and perceptions of reduced safety associated with target shooting would directly and moderately impact visitors' ability to interpret the NHT's historic values and decrease the quality of visitor experiences along the trail. Recreational target shooting could displace other visitors who perceive the activity as compromising their ability to safely recreate in the area. The degree and location of visitor displacement would depend on the location, frequency, and intensity of recreational target shooting. Visitor displacement within the RMZ would likely occur along routes open to motorized travel and easily accessed from El Paso Natural Gas Company pipeline road or SR 238. These would include BLM Roads 8000, 8002, 8003, and 8004, including most sub-segments of these roads.

In the short term, assuming the BLM approves the SDNM Juan Bautista de Anza RMZ Recreation Plan, there would be moderate impacts on recreation in the RMZ, because this area would have the highest concentration of recreation users in the SDNM and the greatest potential for noise and degraded resources from recreational target shooting and ammunition debris, which decrease visitor satisfaction.

Over the long term, resource damage from recreational target shooting would incrementally diminish the quality of recreational experiences in the RMZ. Impacts would be greatest adjacent to roads open to motorized travel in the RMZ and where evidence from recreational target shooting impairs visitors' ability to interpret historic and natural resources along the NHT. Assuming the BLM approves the SDNM Juan Bautista de Anza RMZ Recreation Plan, which would allow motorized travel on designated routes in the RMZ, degraded resources from recreational target shooting would be most evident and impactful on recreation along BLM Roads 8000, 8002, 8003, 8004, and related sub-segments of these roads.

Desert Back Country RMZ

In the Desert Back Country RMZ (433,600 acres), where recreational activities are more primitive and dispersed, there would be minor or negligible direct, short-term impacts from recreational target shooting in most areas. The exception would be along El Paso Natural Gas Company pipeline road and BLM Road 8001, which are popular recreational target shooting areas. These areas are within one hour of population centers and easily accessible by motor vehicle. Alternative A would also remove the temporary recreational target shooting restriction currently in place along El Paso Natural Gas Company pipeline road. There would be moderate short- and long-term reductions in the quality of other recreational activities from noise, a reduced sense of safety, and resource damage from ammunition and target debris.

Over the long term, there would be a decline in the quality of other recreational opportunities near the El Paso Natural Gas Company pipeline road and BLM Road 8001. The intensity of recreational target shooting and decline in resource values could displace some users—particularly those engaged in nonmotorized, quiet activities such as hiking, photography, and sightseeing—to other areas in the Desert Back Country RMZ. However, there would be negligible impacts from recreational target shooters moving to other locations in the RMZ, because the remaining available areas are remote and not easily accessible by motor vehicle, thus making them less desirable for recreational target shooting.

Throughout the remaining portion of the Desert Back Country RMZ, including the three wilderness areas (159,100 acres) and lands managed to protect wilderness characteristics (108,100 acres), there would be negligible impacts on recreation, because these areas are not accessible by motor vehicle and

recreational target shooting is far less common. BLM Roads 8008, 8009, and 8013 provide motorized access opportunities adjacent to lands managed to protect wilderness characteristics. Any noise from isolated and infrequent recreational target shooting would conflict with visitors' desire for backcountry recreational experiences. Recreational target shooting in these areas would also reduce opportunities for solitude in the short and long term. The severity of the impacts on the quality of visitor experiences and opportunities for solitude in wilderness and other backcountry areas would depend on the frequency and intensity of recreational target shooting and on non-recreational target shooting visitors' expectations within those areas.

Long-term, direct and indirect impacts on recreation throughout most of the Desert Back Country RMZ would be negligible due to less frequent use of the RMZ for recreational target shooting. Any debris and resource damage affecting the quality of other recreational opportunities in the Desert Back Country RMZ would most likely be within walking distance of a designated motorized travel route outside of wilderness areas and lands managed to protect wilderness characteristics. This is because target shooters are likely to rely on motorized travel to access preferred recreational target shooting areas.

Monitoring and Mitigation

Monitoring and mitigation could result in some areas being temporarily or permanently restricted to recreational target shooting. Temporary restrictions would reduce the potential for recreational target shooting to conflict with other recreational activities in the restricted area, but could redirect the impacts to other areas until the restriction is removed. These impacts would displace visitors and reduce the quality of recreational opportunities in the short term. A permanent restriction would result in similar impacts over the long term.

Mitigation measures that result in areas continuing to be managed as available for recreational target shooting could also impact other recreational activities. This is because continued recreational target shooting would still present safety concerns and impacts related to litter and resource damage. However, implementation of mitigation measures would be likely to reduce these impacts, thus affecting the intensity, frequency, and duration of impacts on recreation and visitor services. Mitigation measures would be most effective at minimizing impacts on other recreational activities and experiences in areas frequented by recreational target shooting and other recreationists, such as along El Paso Natural Gas Company pipeline road, SR 238, BLM Road 8001, along the Juan Bautista de Anza NHT, and developed recreation sites in the Juan Bautista de Anza NHT RMZ.

Alternative B

Impacts under Alternative B would be similar to those described under Alternative A, except that restricting recreational target shooting in the 10,100-

acre area (2 percent of the decision area) north of the North Maricopa Mountains Wilderness would affect recreational activities and experiences elsewhere in the SDNM, notably the Juan Bautista de Anza NHT RMZ. This is because the restriction would displace target shooters, some of whom would engage in recreational target shooting in the RMZ. The types of impacts on other recreational activities and experiences in the RMZ would be similar to those described under Alternative A, but the intensity and frequency would be greater because there would likely be more recreational target shooting as a result of shooter displacement.

Prohibiting recreational target shooting in the restricted area would reduce or eliminate the potential for conflicts with other recreational activities and would result in less conflict with the ERMA objectives compared with Alternative A. Over the short and long term, there would be little to no direct or indirect impacts on non-recreational target shooting activities in the restricted area. The only potential for impacts would be from any residual resource damage and debris from previous recreational target shooting activity.

Juan Bautista de Anza NHT RMZ

The displacement of recreational target shooting activities from areas along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001 would displace recreational target shooting to areas outside the SDNM as well as other easily accessible locations in the SDNM. Displaced recreational target shooting activities that remain in the SDNM would most likely occur within the 48,700 acres (92 percent) of the Juan Bautista de Anza NHT RMZ that would be available for recreational target shooting. Accordingly, Alternative B would increase the intensity and frequency of recreational target shooting along motorized routes in the RMZ. Compared with Alternative A, there would be greater potential for moderate short-term impacts, such as from noise, debris, and safety concerns, on other recreational activities. The increase in recreational target shooting within the RMZ, particularly near the NHT and developed recreation sites, would decrease the quality of user experiences and displace visitors.

Over the long term, impacts would be similar to those under Alternative A. However, increased resource damage and more frequent recreational target shooting resulting from the restriction of other popular recreational target shooting areas in the SDNM would further diminish visitor satisfaction with the RMZ and impair users' ability to interpret the NHT. The potential for long-term declines in visitor satisfaction would be highest where recreational target shooting occurs adjacent to the NHT and developed recreation sites.

Desert Back Country RMZ

Alternative B would restrict recreational target shooting on 6,000 acres of the Desert Back Country RMZ. Although this restriction would only apply to 1 percent of the RMZ, there would be a disproportionately greater overall

reduction in impacts from recreational target shooting on the RMZ's remote, backcountry character. In the short and long term, eliminating noise, debris and safety concerns from recreational target shooting in the restricted area would expand opportunities for other recreationists to experience the natural history of the Sonoran Desert in a remote, backcountry setting. The restriction would result in a moderate to major change in recreation and visitor experiences and opportunities in the RMZ.

Short- and long-term impacts throughout the remaining 99 percent (427,600 acres) of the RMZ would be the same as those under Alternative A. Recreational target shooters displaced from the restricted area would most likely recreate on other publicly managed lands outside the SDNM or within the Juan Bautista de Anza NHT RMZ.

Monitoring and Mitigation

The types of impacts from monitoring and mitigation would be similar to those described under Alternative A, but would be limited to areas managed as available for recreational target shooting. Mitigation measures that do not restrict recreational target shooting would be most effective at reducing impacts on recreation and visitor services in areas easily accessed by SR 238, along the NHT, and near other developed sites in the Juan Bautista de Anza NHT RMZ.

Mitigation that results in temporary or permanent restrictions on recreational target shooting would further minimize the potential for conflicts with other users in those areas. Temporary or permanent restrictions would provide the greatest benefits for other types of recreational opportunities in the Juan Bautista de Anza NHT RMZ, particularly areas directly adjacent to the NHT and near trailheads, campgrounds, and developed sites. This is because these areas are heavily visited, and reductions in impacts would be more noticeable as a result.

Alternative C

Juan Bautista de Anza NHT RMZ

Recreational target shooting would be restricted in the 52,800-acre Juan Bautista de Anza NHT RMZ. This area is the most visited area in the SDNM, and the restriction would eliminate the potential for conflicts with hiking, camping, and other recreational activities in the RMZ. In addition, the restriction would increase the BLM's ability to meet visitor expectations and provide safe developed and educational opportunities consistent with the ERMA objectives and Monument designation proclamation. This is because there would be less safety risk, noise, litter, and resource damage from recreational target shooting, thereby increasing visitors' ability to successfully interpret historic and natural resources in the RMZ. Compared with current management under Alternative A, the most notable improvements in visitor satisfaction would be for those engaging in nonmotorized, quiet recreational activities such as hiking,

sightseeing, and camping. Visitors to areas adjacent to the NHT, trails, trailheads, and designated campsites would experience the greatest short- and long-term improvements in the quality of recreational opportunities because these areas would no longer be popular for recreational target shooting. Restricting recreational target shooting in the RMZ would eliminate the potential to displace other visitors due to the noise and a sense of reduced safety associated with recreational target shooting.

Desert Back Country RMZ

Restricting recreational target shooting in the Juan Bautista de Anza NHT RMZ would displace target shooters to the Desert Back Country RMZ. In particular, shooter displacement would result in increased recreational target shooting activity along El Paso Natural Gas Company pipeline road and along BLM Roads 8000 and 8001 in the northwestern portion of the SDNM. There would be potential for increased user conflicts and displacement of non-recreational target shooting users in that area. This is because there would likely be increased resource damage and noise, along with a reduced sense of safety, that would directly affect experiences and opportunities in the short and long term for visitors not engaged in recreational target shooting. Over the long term, resource damage and the accumulation of debris from frequent recreational target shooting would impair visitors' ability to interpret the natural history of the Sonoran Desert in this area, resulting in long-term visitor displacement and reduced satisfaction with recreational opportunities in this area.

There would also be a minor increase in recreational target shooting activity and associated impacts in the Desert Back Country RMZ south of SR 238. In the short and long term, there would be the potential for noise and debris from recreational target shooting to create localized impacts on other recreationists, particularly those seeking solitude in a remote, backcountry setting. Resource damage and debris from concentrated recreational target shooting activities adjacent to motorized routes and dispersed recreational target shooting activities further from roads would result in minor long-term impacts on backcountry recreational experiences. The dispersed nature of any recreational target shooting activities south of SR 238 would result in a negligible long-term potential for visitor displacement in that portion of the RMZ.

Monitoring and Mitigation

Mitigation measures would be most effective at reducing impacts on other recreational activities in the northwestern portion of the SDNM along BLM Road 8001 because this area is popular for recreational target shooting and there is a greater potential for mitigation to be implemented and have a noticeable effect. Mitigation measures that continue to manage this area as available for recreational target shooting would result in continued potential for impacts on other recreationists, but the intensity and frequency of impacts could be less and may result in less displacement and less reduction in visitor satisfaction. This is because these measures (e.g., increased patrols, increased

partnership outreach and education, site cleanup, and revegetation) would reduce social impacts on other recreational users by promoting responsible shooting practices and reduce surface disturbance that can degrade other users' recreational opportunities and experiences.

Temporary or permanent restrictions would eliminate noise, safety, and resource-related impacts on other recreation users. Temporarily or permanently restricting recreational target shooting along BLM Road 8001 could displace recreational target shooting activities to publicly managed lands outside the SDNM, because few visitors using this portion of the SDNM for recreational target shooting would move to areas south of SR 238 due to the increase in distance from their homes. Therefore, any temporary or permanent restrictions affecting the BLM Road 8001 area would result in negligible indirect impacts on other portions of the SDNM. There would be negligible to minor changes in the nature and types of impacts from mitigation applied in the Desert Back Country RMZ south of SR 238. A potential change would include minor to moderately improved visitor experiences resulting from fewer isolated noise, debris, and resource impacts that conflict with opportunities for solitude and backcountry experiences in the southern portion of the SDNM.

Alternative D

Restricting recreational target shooting on 319,900 acres (66 percent) of the decision area would eliminate the potential for conflict with other recreational activities in these areas. Compared with Alternative A, Alternative D would better preserve Monument objects related to recreation management, and it would reduce the potential for resource damage, debris, and noise from recreational target shooting to conflict with the objectives of the SDNM ERMA.

Juan Bautista de Anza NHT RMZ

Impacts in the Juan Bautista de Anza NHT RMZ would be the same as those described under Alternative C.

Desert Back Country RMZ

Recreational target shooting would be limited to 166,400 acres in the Desert Back Country RMZ. Specific areas most likely to experience short- and long-term increases in recreational target shooting and associated impacts on other recreational activities include the northwestern corner of the SDNM along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001, near SR 238 and BLM Roads 8032 and 8034, and along BLM Road 8037. The potential for increased conflicts and displacement of non-recreational target shooting users would be similar to that described under Alternative C. Specifically, increased resource damage and noise, along with a reduced sense of safety, would directly affect experiences and opportunities for visitors not engaged in recreational target shooting.

Monitoring and Mitigation

Impacts from monitoring and mitigation would be similar to those under Alternative C, except that making fewer acres available for recreational target shooting may result in less need for applying mitigation measures. In particular, there would be no need for mitigation measures in wilderness areas or lands managed to protect wilderness characteristics, because these areas would be restricted under Alternative D. This is expected to result in a negligible or minor impact on other recreation users in these areas compared with Alternative C, because these areas are not currently popular for recreational target shooting and, as a result, mitigation measures would have little noticeable effect on other users.

Alternative E

Alternative E would restrict recreational target shooting in the entire Monument. As a result, it would eliminate the potential for recreational target shooting to conflict with other recreational activities or impact the principal activities in the SDNM ERMA. Over the short and long term, there would be a negligible to moderate reduction in direct or indirect impacts on recreation and visitor services, depending on the sensitivity of the recreation user or activity, or whether a specific area was popular for recreational target shooting. Accordingly, impacts would be most noticeable in the Juan Bautista de Anza NHT RMZ and the northwestern corner of the SDNM along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001.

Monitoring and Mitigation

Under alternative E, monitoring would help ensure the proposed restriction of the SDNM for recreational target shooting would be enforced and the potential for impacts on recreation and visitor services would be eliminated.

4.3.3 Recreational Target Shooting

This section discusses impacts on recreational target shooting from the proposed alternatives in **Chapter 2**. Existing conditions are described in **Section 3.3.3**, Recreational Target Shooting.

Methods of Analysis

Indicators of impacts on recreational target shooting include the following:

- Number of acres available or restricted for recreational target shooting
- Potential for mitigation measures that result in a change in acres available or restricted to recreational target shooting

The analysis includes the following assumptions:

- Overall visitation to the SDNM will continue to increase as the regional population grows. As visitation increases, there will be an increasing demand for recreational target shooting.
- Noise from recreational target shooting may be experienced at different levels by other visitors or wildlife. Sound from recreational target shooting is variable and depends on, but is not limited to, the type of equipment used, time of day, wind velocity and direction, topographic and vegetative screening, elevation, aspect, and temperature.
- The amount of mitigation required to offset environmental impacts from recreational target shooting would be commensurate with the number of acres available or restricted to recreational target shooting
- A greater number of acres available would require mitigation measures over a larger area of the SDNM
- As a result of monitoring, the BLM may determine the need to implement mitigation measures for recreational target shooting. These measures, which could include a change in the number of acres temporarily managed as available or restricted, would provide a scaled response proportionate with the level of impacts observed during the monitoring process.

Nature and Type of Effects

The nature and types of effects on recreational target shooting would be similar to those described under **Section 4.3.2**, Recreation Management. Principally, managing areas as available to recreational target shooting allows users to participate in the activity. On lands managed as available, there would be little to no impact on users' ability to engage in recreational target shooting. Restricting areas to recreational target shooting would eliminate opportunities for visitors to engage in the activity. Restricting areas would result in a direct impact on recreational target shooting.

Motorized travel provides access for recreational target shooting. Areas with few motorized travel routes—such as wilderness areas and lands managed to protect wilderness characteristics—or areas where travel management planning resulted in routes being designated as closed to motorized travel, would be unpopular for recreational target shooting. Similarly, restricting areas with motorized access would not necessarily result in recreational target shooting activities being redistributed to adjacent areas that do not have motorized access. Instead, recreational target shooters would seek other nearby areas with motorized access.

Effects Common to All Alternatives

Under all alternatives, wilderness areas and lands managed to protect wilderness characteristics, which collectively account for 267,200 acres (55 percent) of the

decision area, would continue to be less popular areas for recreational target shooting because there is no motorized vehicle access. There would be negligible impacts on recreational target shooting from management within these areas.

Under all alternatives, the BLM would monitor the impacts from recreational target shooting and apply mitigation measures as appropriate. Mitigation measures that result in temporary or permanent restrictions would reduce or eliminate recreational target shooting activities over the short and long term, resulting in moderate to major impacts on the activity. Mitigation that maintains areas as available would preserve recreational target shooting opportunities, but could limit the ways users engage in the activity. This would result in a negligible to moderate impact depending on the intensity and duration of the measure being taken.

Alternative A

Under a continuation of current management, 100 percent (486,400 acres) of the decision area would be available to recreational target shooting, thereby maintaining recreational target shooting opportunities throughout the entire Monument. Target shooters would experience no change in their ability to engage in the activity, and impacts would be negligible. The most popular areas in the SDNM would be those easily accessed using motorized vehicles.

Monitoring and mitigation under Alternative A could result in some areas being temporarily or permanently restricted to recreational target shooting. Temporary restrictions would eliminate opportunities for recreational target shooting until the restriction is removed. A permanent restriction would eliminate opportunities in the restricted area over the long term. Both types of restrictions would displace target shooters to other portions of the SDNM or other nearby areas.

The BLM may also implement mitigation measures to reduce the impacts of recreational target shooting on other resources and uses without restricting the activity. Mitigation measures that maintain areas as available for recreational target shooting would maintain opportunities for recreational target shooting, but mitigation specifically implemented to reduce the short- and long-term impacts of recreational target shooting could affect how users participate in the activity. For example, mitigation measures intended to minimize resource damage and debris could limit the types of ammunition or targets allowed to be used and may cause target shooters to go elsewhere where these measures are not applied.

Alternative B

Alternative B would result in similar impacts on recreational target shooting as described under Alternative A, except that 10,100 acres (2 percent) of the decision area north of the North Maricopa Mountains Wilderness would be permanently restricted to recreational target shooting. Although the restriction

would only apply to 2 percent of the decision area, the result would be moderate to major impacts on recreational target shooting opportunities, because the area is easily accessed via El Paso Natural Gas Company pipeline road and BLM Road 8001 and is within an hour drive of several regional population centers. For these reasons, it is one of the most popular recreational target shooting areas in the SDNM. Alternative B would eliminate opportunities for visitors to engage in recreational target shooting in this area and reduce the overall opportunities within the SDNM. Remaining opportunities for recreational target shooting that are also accessible via motorized vehicle would mainly include the 48,700 acres of available areas in the Juan Bautista de Anza NHT RMZ. There would also be 427,600 acres remaining available in the Desert Back Country RMZ. However, 267,200 (62 percent) of these acres would be wilderness or lands managed to protect wilderness characteristics. Areas east of the South Maricopa Mountains Wilderness near SR 238 would continue to provide motorized access to recreational target shooting opportunities.

Impacts from monitoring and mitigation would be similar to those under Alternative A, but they would only apply to areas managed as available for recreational target shooting. Mitigation measures that do not restrict recreational target shooting would preserve recreational target shooting opportunities, particularly in the Juan Bautista de Anza NHT RMZ and areas easily accessed by SR 238. The types of impacts from these measures are the same as described under Alternative A.

Temporary or permanent restrictions would further reduce opportunities for recreational target shooting in the SDNM and may force target shooters to go elsewhere. The intensity of impacts would depend upon the location of the restricted areas and the duration of the restriction. If the BLM imposes restrictions in the Juan Bautista de Anza NHT RMZ and areas directly south of SR 238, then those restrictions would eliminate most or all remaining popular recreational target shooting opportunities in the SDNM, and target shooters would mostly likely seek opportunities on publicly managed lands outside the SDNM.

Alternative C

Recreational target shooting opportunities would be eliminated in the 52,800-acre Juan Bautista de Anza NHT RMZ (11 percent of the decision area), but it would be maintained elsewhere, including popular areas along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001 in the northwestern portion of the SDNM. Implementation of Alternative C would also maintain opportunities along roadways directly south of SR 238. Accordingly, Alternative C would result in minor impacts on recreational target shooting opportunities compared with Alternative A, because several easily accessible areas would remain available.

Mitigation measures that maintain recreational target shooting in popular areas, such as those along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001, would preserve recreational target shooting opportunities but could affect how users participate in the activity. More stringent measures would likely result in target shooters preferring to go elsewhere (both in and out of the SDNM).

Temporary or permanent restrictions, especially if imposed at popular recreational target shooting areas, would eliminate opportunities over the short or long term. The extent and duration of the impact on recreational target shooting opportunities would depend on the location and size of the restricted area and whether the restriction would be temporary or permanent. If mitigation measures temporarily or permanently restrict recreational target shooting along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001, then there would be a moderate decline in available recreational target shooting opportunities, because this area is valued by target shooters.

Alternative D

Alternative D would eliminate recreational target shooting opportunities on 319,900 acres (66 percent) comprising wilderness areas, lands managed to protect wilderness characteristics, and the Juan Bautista de Anza NHT RMZ. Although Alternative D would increase the portion of the decision area restricted to recreational target shooting by 267,100 acres, impacts would be similar to those described under Alternative C. This is because wilderness areas and lands managed to protect wilderness characteristics prohibit motorized vehicle access and are, therefore, not popular recreational target shooting areas. As under Alternative C, Alternative D would preserve recreational target shooting opportunities over the long term at popular, easily accessible locations, such as along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001.

Impacts from monitoring and mitigation would be the same as those described under Alternative C.

Alternative E

Alternative E would restrict recreational target shooting in the entire SDNM, which would eliminate opportunities for visitors to participate in recreational target shooting. Monitoring would help ensure the proposed restriction of the SDNM for recreational target shooting would be enforced. Visitors seeking recreational target shooting experiences would be required to seek areas outside of the SDNM. Accordingly, Alternative E would result in a major, direct, long-term impact on recreational target shooting in the SDNM.

4.3.4 Travel Management

This section discusses impacts on travel management from the proposed alternatives in **Chapter 2**. Existing conditions are described in **Section 3.3.4**, Travel Management

Methods of Analysis

Indicators of impacts on travel management include the following:

- Areas or routes designated as open, limited, or closed to motorized, OHV, or mechanized travel
- The BLM's ability to provide safe access for the designated travel modes for each route within the SDNM

The analysis includes the following assumptions:

- The regional population surrounding the SDNM will continue expanding, which will increase the demand for motorized, nonmotorized, and mechanized travel on BLM-administered lands
- Increasing use of the travel network will increase the demand placed on the BLM to maintain the travel network within the SDNM
- Management of areas as available or restricted to recreational target shooting influences the demand for access via the existing travel network. In areas managed as available to recreational target shooting, the demand for access would be higher than in restricted areas.
- The BLM has no authority over other federal, state, or county roads on BLM-administered lands; therefore, such routes are not included in the analysis
- The BLM cannot control access through private property. Access to BLM-administered lands through adjoining private lands without the willing consent of the landowner is trespass.

Nature and Type of Effects

Impacts on travel management are those that restrict or enhance the use of, and access to, the travel network, primarily through the management of areas and routes as open, closed, or limited to motorized, OHV, or mechanized travel. For example, management that closes an area or route to OHV travel would limit the number of acres or route miles available for OHV travel. At the same time, a limited OHV designation may impact mechanized and nonmotorized travel in the previously open areas or routes by reducing encounters with motorized vehicles. Route designations focus management attention on providing specific types of access on designated routes, thereby improving management efficiency.

Management of other resource uses, such as recreational target shooting, can impact access via the travel network by reducing or increasing the number of vehicles traveling on designated routes. In areas or on routes that cross or provide access to areas available for recreational target shooting, there would be more vehicle traffic than on routes within areas restricted for recreational

target shooting. Increased traffic and parking along roadways adjacent to recreational target shooting areas would affect users' ability to safely travel on the route. The perception of impaired safety adjacent to active recreational target shooting may also affect access for some travelers, particularly pedestrians and equestrian users.

Effects Common to All Alternatives

Under all alternatives, there would be no change in the amount of areas or routes managed as open, closed, or limited to OHV use.

Alternative A

Under a continuation of current management, which would maintain recreational target shooting opportunities throughout the entire Monument, visitors requiring access for recreational target shooting would continue to place a demand on the BLM travel network. There would continue to be 342 miles of roads, primitive roads, and trails managed as open for motorized access to available recreational target shooting areas in the SDNM. The demand for access and associated impacts would be greatest on roadways providing access to popular recreational target shooting areas that are within one hour of population centers. Roadways likely to experience the most vehicle travel for access to recreational target shooting include BLM Roads intersecting El Paso Natural Gas Company pipeline road or SR 238, such as 8000, 8001, 8002, 8032, and 8034.

If the BLM approves the SDNM Juan Bautista de Anza RMZ Recreation Plan (BLM 2016), there would also be conflicts with pedestrians and equestrians in the Juan Bautista de Anza NHT RMZ from those accessing recreational target shooting opportunities. These routes would continue to experience some site-specific congestion, including from vehicles parked along the roadways. This would decrease access for motorized and nonmotorized travelers. There would be impaired access for nonmotorized users, particularly pedestrians and equestrians, due to the increased number of vehicles and safety concerns associated with recreational target shooting adjacent to the roadway.

Monitoring and mitigation under Alternative A could result in some areas being temporarily or permanently restricted to recreational target shooting. Temporary restrictions would reduce the number of vehicles and safety-related access conflicts with pedestrians and equestrians on access roads used for recreational target shooting until the restriction is removed. A permanent restriction would reduce these impacts over the long term.

The BLM may also implement mitigation measures to reduce the impacts of recreational target shooting on other resources and uses without restricting the activity within a given area. Mitigation measures that maintain areas as available for recreational target shooting would result in continued potential for impacts on travel management if target shooters are not displaced. Mitigation specifically implemented to reduce the short- and long-term impacts of recreational target

shooting on travel management could minimize the number of vehicles on designated routes and improve access. There would continue to be a demand on the BLM to maintain motorized vehicle routes.

Alternative B

Impacts on travel management under Alternative B would be similar to those described under Alternative A, except near 10,100 acres (2 percent) of the decision area along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001 where recreational target shooting would be restricted. Although there would continue to be 317 miles of roads, primitive roads, and trails (7 percent fewer than Alternative A) managed as open for motorized access to available recreational target shooting areas in the decision area, the restriction would result in a moderate to major decline in impacts on the 26 miles of designated open routes in the restricted area. BLM Roads 8000 and 8001, accessed via El Paso Natural Gas Company pipeline road, are some of the most frequently used routes for accessing recreational target shooting opportunities in the SDNM.

Restricting recreational target shooting adjacent to these roadways would result in a moderate change in the frequency and intensity of vehicle travel on the roadways. There would be fewer motorized vehicles traveling on and parking along the roadways. Implementation of Alternative B would also improve access for pedestrian and equestrian travelers on BLM Roads 8000 and 8001 by reducing noise and safety concerns associated with recreational target shooting.

Although Alternative B would only restrict 2 percent of the decision area and apply to 7 percent of all roads managed as open for motorized access in the decision area, the restriction would apply to the most popular recreational target shooting areas, resulting in a disproportionately larger impact on the travel network. Restricting recreational target shooting along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001 would shift a portion of the existing activity to other locations in the SDNM. Routes most likely to experience minor impacts from increased motorized travel include BLM Roads 8002, 8003, 8032, 8034, 8039 and other BLM routes designated as open for motorized travel that are easily accessed from SR 238.

Impacts from monitoring and mitigation would be similar to those described under Alternative A, but they would apply to the remaining areas managed as available for recreational target shooting. Mitigation measures that do not restrict recreational target shooting would be most effective at reducing impacts on travel management in areas easily accessed by SR 238. Other areas and routes are either closed to motorized travel or not easily accessible from nearby population centers via paved roadways.

Mitigation resulting in temporary or permanent restrictions would further reduce the potential for recreational target shooting and associated vehicle use to impact travel management in those restriction areas. The nature and type of

impacts in areas remaining available for recreational target shooting would depend upon the location of the restricted areas.

Alternative C

Managing the 52,800-acre Juan Bautista de Anza NHT RMZ (11 percent of the decision area) as restricted to recreational target shooting would eliminate impacts on travel management from visitors accessing recreational target shooting opportunities in this RMZ. There would be 44 fewer miles of roads, primitive roads, and trails managed as open for motorized access in available recreational target shooting areas. Assuming the BLM approves the SDNM Juan Bautista de Anza NHT RMZ Recreation Plan that would include opening most routes to motorized travel that were temporarily closed in 2008, Alternative C would result in a moderate improvement in access and safety in the RMZ compared with Alternative A. In particular, restricting recreational target shooting adjacent to roadways in the RMZ would reduce the number of vehicles and improve access for nonmotorized travelers.

Implementation of Alternative C would likely displace target shooters not able to access recreational target shooting opportunities in the Juan Bautista de Anza NHT RMZ to open routes further west, off of El Paso Natural Gas Company pipeline road. As a result, there would be an increased number of vehicles and access concerns for nonmotorized travelers near these roads, especially BLM Road 8001. Displaced recreational target shooters seeking other opportunities in the SDNM would also increase motor vehicle use and associated impacts on roads directly south of and accessible via SR 238.

Mitigation measures would be most effective at reducing impacts if implemented along BLM Road 8001. Mitigation measures that continue to manage areas adjacent to BLM Road 8001 as available for recreational target shooting would maintain levels of vehicle travel on routes and associated safety concerns. Temporary restrictions would reduce or eliminate these impacts in the near-term, while permanent restrictions would eliminate impacts in the short and long term.

Alternative D

Alternative D would manage the Juan Bautista de Anza NHT RMZ and all wilderness areas and lands managed to protect wilderness characteristics (319,900 acres; 66 percent of the decision area) as restricted for recreational target shooting. Although Alternative D would restrict recreational target shooting on 267,100 more acres than Alternative C, impacts under the two alternatives would be similar. This is because the additional restrictions under Alternative C would apply to areas that are closed to motorized travel and are not easily accessible for recreational target shooting. Under Alternative D, the roads, primitive roads, and trails managed as open for motorized access in available recreational target shooting areas would be 45 miles less than under Alternative A and 1 mile less than under Alternative C. Accordingly, impacts on

travel management would be nearly the same as under Alternative C in these areas.

In the short and long term, there would be increases in the number of motorized vehicles and associated safety concerns for nonmotorized travelers mainly along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001, near SR 238 and BLM Roads 8032 and 8034, and potentially along BLM Road 8037.

Impacts from monitoring and mitigation would be the same as those described under Alternative C. There would be no need for mitigation measures to address the negligible potential for impacts from recreational target shooting in wilderness areas or lands managed to protect wilderness characteristics, because these areas would be restricted under Alternative D.

Alternative E

Restricting recreational target shooting throughout the entire SDNM would eliminate motor vehicle travel associated with recreational target shooting and safety related access limitations for pedestrians and equestrians, because all 342 miles of roads, primitive roads, and trails managed as open for motorized access would be in restricted recreational target shooting areas. Compared with Alternative A, BLM Roads 8000 (including segments 8000B, C, and E), 8001, and 8002 would experience moderate improvements in accessibility and safety. Roads in the Juan Bautista de Anza NHT RMZ near SR 238—such as BLM Roads 8003, 8032, and 8034—and potentially along BLM Road 8037 would have minor improvements. There would be negligible changes to safety and travel along other roads. Overall impacts on travel management for the SDNM would be minor due to the localized nature of the changes.

Under Alternative E, monitoring would help ensure the proposed restriction of the SDNM to recreational target shooting would be enforced and the potential for impacts on travel management would be reduced as visitors seeking access to recreational target shooting experiences would do so outside of the SDNM.

4.4 Special Designations

4.4.1 National Conservation Lands

As described in detail in **Section 3.4.1**, National Conservation Lands, the purpose of the SDNM is to protect and manage the SDNM's natural, geologic, and cultural resources (i.e., SDNM objects) for long-term conservation and to further our knowledge and understanding of such resources through scientific research and interpretation. **Table 4-28**, Sonoran Desert National Monument Objects, provides a detailed description of the objects in Presidential Proclamation 7397 for which the SDNM was designated to protect. For analysis of impacts from recreational target shooting on these objects, refer to the sections listed in the following table.

Table 4-28
Sonoran Desert National Monument Objects

Object	Section Describing Impacts on Object
Functioning desert ecosystem	4.2.4, Soils 4.2.5, Vegetation
Diversity of plant and animal species	4.2.5, Vegetation 4.2.3, Priority Wildlife Species and Habitat
Saguaro cactus forests	4.2.5, Vegetation
Sand Tank Mountains	4.2.5. Vegetation
Scientific analysis of plant species and climates	4.2.5, Vegetation 4.2.2, Cultural and Heritage Resources
Vegetation communities: Creosote Bush-Bursage, Desert Grassland, and Washes	4.2.4, Soil Resources 4.2.5, Vegetation
Wildlife	4.2.3, Priority Wildlife Species and Habitat
Archaeological and historic sites	4.2.2, Cultural and Heritage Resources

4.4.2 Congressional Designations

Existing special designations reviewed in this section include wilderness areas and the Juan Bautista de Anza NHT. Within the decision area, there are three wilderness areas: North Maricopa Mountains, South Maricopa Mountains, and Table Top. Section 2(c) of the 1964 Wilderness Act identifies wilderness as having four qualities—untrammeled, natural, undeveloped, and a place for solitude or a primitive and unconfined type of recreation. All wilderness areas exhibit these four characteristics. Wilderness character is also likely to include less-tangible elements, such as scenic beauty and qualities that promote self-discovery and self-reliance for those who experience it. This chapter discusses the impacts from management of recreational target shooting on these wilderness areas. Existing conditions are described in **Section 3.4.2**, Congressional Designations.

Current management of the Juan Bautista de Anza NHT is consistent with a management plan developed by the NPS and completed in cooperation with the BLM and other agencies and organizations. The National Scenic and Historic Trail Policy Act and the BLM National Scenic and Historic Trails Strategy (2006) provide additional guidance. Existing conditions are described in **Section 3.4.2**, Congressional Designations.

Methods of Analysis

Indicators of impacts on wilderness areas include the following:

- Changes to the landscape that alter naturalness, and untrammeled and undeveloped condition in the wilderness. Naturalness, undeveloped, and untrammeled are affected by surface-disturbing activities and associated human uses and developments.

- Ability to experience outstanding opportunities for solitude and/or primitive and unconfined recreation in wilderness areas. Opportunities for primitive and unconfined recreation are affected by the presence of motorized activities and the availability, or nonavailability, of landscapes free of surface-disturbing activities and the sights and sounds of human uses and their developments.
- Changes to the landscape that alter the quality of scenic beauty and the opportunity to promote self-discovery and self-reliance

The analysis of impacts on wilderness areas include the following assumptions:

- Uses and activities occurring outside wilderness areas could influence wilderness areas, though such influences would generally be indirect

Indicators of impacts on Juan Bautista de Anza NHT include the following:

- Damage or loss of the physical environment of the Juan Bautista de Anza corridor and other historic trails, including the arrangement or structure of site or historic trail elements, and associated cultural sites
- Artifacts missing or rearranged
- Alterations to the historic sense of a particular period of time or the feeling of historic trail or the associated site's context
- Changes to the landscape settings, to the level that historic trail and associated site values and qualities are diminished

The analysis on Juan Bautista de Anza NHT includes the following assumptions:

- The Juan Bautista de Anza NHT is a historic trail corridor with no identified physical remains
- Historic trails and associated sites are considered cultural resources. The historic wagon and stage trails sometimes overlay the Juan Bautista de Anza NHT.
- Ground/surface-disturbing activities can be natural or human caused. Human disturbance can occur from trampling, digging, vandalism, unauthorized collection, and wildfires started by human activities.
- Measures that restrict surface activities to protect resources can provide direct and indirect protection of historic trail and associated cultural resources from disturbance and from incompatible and unauthorized activities

- Natural processes, such as erosion or weathering, would degrade the integrity of many types of historic trail and cultural resources over time. Human visitation, recreation, and other activities can increase the rate of deterioration through natural processes. While the effect of a few incidents may be negligible, the effect of repeated actions or visits over time could intensify impacts.
- Vandalism or unauthorized collecting can destroy historic trails and associated cultural resources in a single incident. Exposure or access to areas where these resources are present can increase the risk of vandalism or unauthorized collection of artifacts.
- Site monitoring, non-project-related inventories, interpretive development, site stabilization, and other proactive management activities would continue
- Uses and activities occurring outside NHT corridors could influence the NHT, though such influences would generally be indirect

Nature and Type of Effects

As described in **Section 4.3.2**, Recreation Management, impacts on visitors are generally the result of conflicts between recreational uses, management related to other resources and resource uses, and stipulations placed on resource uses. These conflicts can affect the quality of visitor opportunities to enjoy wilderness or NHTs. The duration, frequency, and intensity of specific types of activities influence the nature and type of impacts. For instance, conflicts between those participating in recreational target shooting and those engaged in activities other than recreational target shooting would increase as more users participate in each activity within the SDNM. Likewise, larger areas of physical disturbance would increase the intensity of alterations on wilderness qualities and NHT landscape settings or the associated site's context. There would be the potential for diminished opportunities for visitors to experience wilderness qualities and the historic trail or associated site's context in all unrestricted recreational target shooting areas, but the greatest impacts would be where recreational target shooting and non-target shooting recreational activities are both popular.

Wilderness Areas

The overall impacts on the scenic beauty of wilderness areas would be negligible, because recreational target shooting is typically confined to a few areas near vehicle routes outside wilderness areas; therefore, the overall scenic beauty of the wilderness areas would not be diminished. Impacts on visitors' ability to experience self-discovery and self-reliance would not be diminished because of recreational target shooting. Visitors to wilderness areas would continue to have these types of opportunities. Therefore, impacts on these supplemental values of wilderness will not be discussed further in this section.

Recreational target shooting is mostly dependent on vehicles to access sites for recreational target shooting; therefore, the impacts described below are more

likely to occur in the perimeter of wilderness areas, because motor vehicle use for recreational purposes is not allowed in wilderness areas. Motor vehicles traveling to recreational target shooting sites in wilderness areas would be required to stop at the wilderness boundary and proceed via nonmotorized travel. Therefore, most recreational target shooting sites would likely be near the intersection of routes and wilderness boundaries.

Recreational target shooting in wilderness areas would result in long-term, direct disturbance of the landscape when natural objects are destroyed and landscapes are scarred from destruction or disturbance of groundcover (native vegetation and soils) from bullet strikes and human trampling, and when targets, shells, ammunition, and other litter are left behind. This would diminish opportunities for visitors to experience naturalness and untrammeled, undeveloped wilderness at these locations.

Noise from gunfire in and adjacent to wilderness areas, including repetitive and lengthy recreational target shooting, would directly impact visitors' experiences in the short term. Visitors would also tend to avoid recreational target shooting areas in order to avoid the noise and potential for stray bullets (see **Section 4.5.2**, Hazardous Materials and Public Safety, for a detailed analysis of impacts on public safety). Localized noise impacts and concerns for safety from potential stray bullets around recreational target shooting sites would diminish opportunities to experience solitude or primitive and unconfined recreation near recreational target shooting sites.

Motor vehicle use, including OHV use, is a popular activity in the SDNM. Although motor vehicles used for recreational purposes are not allowed in wilderness areas, they are frequently used to access recreational target shooting sites in and outside wilderness areas. Noise and movement from these vehicles on designated routes adjacent to wilderness areas would contribute to short-term, indirect impacts on visitors' opportunities for solitude or primitive and unconfined recreation in the perimeter of wilderness areas. Visitors would also feel confined to the interior of wilderness areas in order to avoid the noise or presence of motor vehicles. These impacts would increase with greater areas available for recreational target shooting, and would decrease with fewer areas available. The level of noise and disturbance from motor vehicles would also be dependent on how close these vehicles traveled next to wilderness areas.

Discharge of firearms and other activities related to recreational target shooting (e.g., campfires) in and adjacent to wilderness areas would be a potential source of ignitions. When certain types of bullets strike rocks or other objects, they can throw sparks that ignite surrounding vegetation and quickly spread (Finney et al. 2013). Exploding targets could also start wildfires if they are used. Potential wildfires that burn in wilderness areas would indirectly diminish visitors' opportunities to experience naturalness over the long term because of surface disturbance and scarring. The potential and magnitude of wildfires, and

impacts on naturalness, would depend on the surrounding vegetation communities, surface fuel conditions, and suppression. See **Section 4.2.8**, Wildfire Management, for analysis of impacts on wildfire, **Section 4.2.4**, Soil Resources, for impacts on soil resources, and **Section 4.2.5**, Vegetation, for analysis of impacts on vegetation.

Restricting recreational target shooting in and adjacent to wilderness areas would enhance visitors' opportunities to experience naturalness and untrammeled and undeveloped wilderness by removing the long-term, direct threat of landscape disturbance from ammunition and target shooters, and the long-term, indirect impact of scarring and surface disturbance from potential wildfires. Opportunities for solitude or primitive and unconfined recreation would also be enhanced. Restricting recreational target shooting would remove the short-term, direct threat of noise and safety concerns from gunfire, and indirect noise associated with motor vehicle use.

Juan Bautista de Anza National Historic Trail

Impacts on the Juan Bautista de Anza NHT corridor from recreational target shooting include long-term, direct loss, damage, or destruction of the physical environment of the trail corridor—including site or historic trail elements and associated artifacts and cultural sites—from bullet strikes and human trampling, and when targets, shells, ammunition, and other litter are left behind. This results in localized, long-term, direct changes to the landscape setting for which the NHT corridor is managed.

Recreational target shooting along, near, or crossing the NHT corridor would diminish the opportunities for visitors to experience the overall sense of time and context similar to the experience Anza would have encountered traveling the corridor. Visitors' experiences would be impacted in the short term by the noise from gunfire, especially repetitive and lengthy shooting. Dispersed recreational target shooting would also create a safety risk to visitors in the NHT corridor (see **Section 4.5.2**, Hazardous Materials and Public Safety, for a detailed analysis of these types of impacts).

Motor vehicle use to access recreational target shooting sites would also indirectly impact visitors' opportunities to experience the overall setting of the NHT corridor in the short term due to noise and the presence of vehicles. The level of impacts depends on how close motor vehicles travel next to the NHT corridor.

Any wildfire caused by recreational target shooting, or associated activities, that burns in the NHT corridor would indirectly impact the physical environment and landscape settings of the NHT corridor in the long term by burning the vegetation and scarring the landscape. This could result in long-term changes to the landscape settings to the level that historic trail and associated site values are diminished.

Restricting recreational target shooting in and adjacent to the NHT corridor would eliminate a source of potential long-term damage or loss of the physical environment, and artifacts and cultural sites associated with the NHT corridor. Restrictions on recreational target shooting in these areas would also eliminate potential alterations of visitors' sense of the historic time period or context associated with the NHT corridor. Eliminating noise from gunfire along, near, or crossing the NHT corridor would eliminate a potential short-term, direct alteration to the landscape setting that the corridor is managed for, as well as a safety risk.

Restrictions would also eliminate the indirect impacts from motor vehicle noise and potential wildfires. Removing use of motor vehicles accessing recreational target shooting sites would help maintain visitors' opportunities to experience the overall setting of the NHT corridor in the short term. Reducing the risk of potential wildfires from bullet strikes, or associated activities, would help preserve the physical environment and landscape settings of the NHT corridor in the long term.

Effects Common to All Alternatives

Wilderness Areas

Restricting recreational target shooting temporarily or permanently in or adjacent to wilderness areas would enhance visitors' opportunities to experience naturalness, and untrammeled and undeveloped wilderness by removing the threat of direct and indirect landscape disturbance from ammunition, trampling, and potential wildfires, as described under *Nature and Type of Effects*. Opportunities for solitude or primitive and unconfined recreation would also be enhanced. As described under *Nature and Type of Effects*, restrictions would remove noise and safety concerns from gunfire and noise and disturbance from motor vehicles used to access recreational target shooting sites. However, the locations and magnitude of impacts on wilderness qualities would depend on the locations of restricted areas.

Implementing nonrestrictive mitigation measures (e.g., increased law enforcement, cleanup efforts, signage, and education) would likely decrease the threat of landscape disturbance from recreational target shooting, as described under *Nature and Type of Effects*. These measures could enhance visitors' opportunities to experience naturalness, and untrammeled and undeveloped wilderness. Because recreational target shooting would still occur with mitigation measures, gunfire noise and motor vehicle noise and disturbance adjacent to wilderness areas would continue to directly and indirectly diminish visitors' opportunities for solitude or primitive and unconfined recreation, as described under *Nature and Type of Effects*. However, the locations and magnitude of impacts would depend on the type of measures. Frequent on-site patrols would result in the greatest protection of wilderness qualities.

Juan Bautista de Anza National Historic Trail

Restricting recreational target shooting temporarily or permanently in and adjacent to the Juan Bautista de Anza NHT corridor would eliminate a source of potential localized, long-term damage or loss of the physical environment, and artifacts and cultural sites associated with the NHT corridor, as described under *Nature and Type of Effects*. Restrictions on recreational target shooting in these areas would eliminate gunfire noise and the potential alteration of visitors' sense of the historic time period or context of the NHT corridor, as described under *Nature and Type of Effects*. Restrictions would also eliminate the indirect impacts on visitors and the landscape from motor vehicle noise and disturbance and potential wildfires, as described under *Nature and Type of Effects*. However, the locations and magnitude of impacts on the NHT corridor would depend on the locations of restricted areas.

Implementing nonrestrictive mitigation measures (e.g., measures that do not restrict recreational target shooting, such as increased patrols or revegetating a shooting site) in and adjacent to the NHT corridor would likely decrease the potential long-term damage or loss of the physical environment, artifacts, and cultural sites, as described under *Nature and Type of Effects*. Because recreational target shooting would still occur with mitigation measures, short-term gunfire and motor vehicle noise and disturbance could still alter visitors' sense of the historic time period and context associated with the NHT corridor, as described under *Nature and Type of Effects*. The indirect threat of potential wildfires from recreational target shooting altering the NHT corridor landscape would still continue, as described under *Nature and Type of Effects*. However, the locations and magnitude of impacts would depend on the type of measures. Frequent on-site patrols would result in the greatest protection of the corridor's physical environment and the artifacts and cultural sites.

Alternative A

Wilderness Areas

Under a continuation of current management, the BLM would manage 100 percent (486,400 acres) of the decision area, including all wilderness areas (159,100 acres) as available to recreational target shooting. Visitors would experience no change in opportunities to experience wilderness qualities.

North Maricopa Mountains Wilderness. Recreational target shooting would continue to result in direct destruction of objects and disturbance of landscapes from gunfire and trampling at recreational target shooting sites, as described under *Nature and Type of Effects*. These direct impacts could continue to occur anywhere in the wilderness area, but they would likely occur in the perimeter areas easily accessed with motor vehicles. Changes to the landscape would continue to result in site-specific to localized, long-term, minor, direct impacts on visitors' opportunities to experience natural, and untrammeled and undeveloped wilderness.

Noise from gunfire and perceived safety concerns from stray bullets would continue to directly alter visitors' wilderness experiences, as described under *Nature and Type of Effects*. This would continue to result in localized, long-term, moderate, direct impacts on visitors' opportunities for solitude or primitive and unconfined recreation. Gunfire noise and stray bullets would only be noticeable during recreational target shooting, but these types of impacts would occur throughout the 20-year planning timeframe.

Recreational target shooting would continue to result in indirect impacts from noise and vehicle movements related to motor vehicles accessing recreational target shooting sites in wilderness and outside wilderness, as described under *Nature and Type of Impacts*. Impacts from these vehicles would contribute to impacts on wilderness visitors from motor vehicles used by non-recreational target shooters. Visitors would feel limited to the interior of the wilderness area in order to avoid impacts from motor vehicles. Noticeable vehicle noise and presence would result in localized, short-term, moderate, indirect impacts on opportunities for solitude or primitive and unconfined recreation in the perimeters of wilderness areas. These types of indirect impacts would likely continue to occur at locations next to the northern wilderness boundary along the El Paso Natural Gas Company pipeline road and BLM Road 8001 (including most sub-segments). However, they could occur along BLM Roads (including most sub-segments) 8002, 8003, 8004, 8006, or other areas where recreational target shooting occurs.

As described under *Nature and Type of Effects*, discharge of firearms would be a potential indirect source of ignitions and potential wildfires. This would continue to result in potential localized, long-term, negligible to moderate, indirect impacts on visitors' opportunities to experience naturalness, and untrammeled and undeveloped wilderness. The potential for recreational target shooting-related wildfires would continue to occur at locations next to the northern boundary of the North Maricopa Mountains Wilderness along the El Paso Natural Gas Company pipeline road; however, they could occur in other areas where recreational target shooting occurs.

Monitoring and Mitigation

Since the entire decision area would be available for recreational target shooting under Alternative A, there would be a high likelihood that the BLM would have to implement restriction or mitigation measures. Implementing temporary or permanent restrictions in the wilderness area would result in fewer areas of landscape disturbance, as described under *Effects Common to All Alternatives*. The direct and indirect impacts from restrictions could occur anywhere in the wilderness area; however, the restrictions are likely to occur in areas already experiencing disturbance, especially where vehicle routes intersect with wilderness boundary. Restricting areas would enhance wilderness landscapes, resulting in site-specific to localized, negligible, long-term, direct, and indirect impacts on visitors' opportunities to experience naturalness, and untrammeled

and undeveloped wilderness. The elimination of gunfire in restricted areas would remove noise and safety concerns in these areas, resulting in localized, negligible, short-term, direct impacts on visitors' opportunities for solitude, or primitive and unconfined recreation.

Implementing restrictions in areas adjacent to wilderness would reduce motor vehicle noise and travel, resulting in localized, minor, short-term, indirect impacts on opportunities for solitude, or primitive and unconfined recreation in the perimeter of adjacent wilderness. Motor vehicle use for other purposes would still continue. The indirect impacts could occur anywhere in the wilderness area; however, the restrictions are likely to occur in areas already experiencing disturbance, as described above.

Implementing nonrestrictive mitigation measures could result in fewer areas of landscape disturbance from bullets, trampling, and potential wildfires, as described under *Nature and Type of Effects*. The direct and indirect impacts from these restrictions could occur anywhere in the wilderness area; however, the measures are likely to occur in areas already experiencing disturbance, especially where vehicle routes intersect with wilderness boundary. Nonrestrictive measures would result in site-specific to localized, negligible to minor, long-term, direct, and indirect impacts on visitors' opportunities to experience naturalness, and untrammeled and undeveloped wilderness. Because recreational target shooting would still occur in wilderness areas, gunfire would continue to alter visitors' wilderness experiences from noise and safety concerns, resulting in localized, short-term, moderate, direct impacts on visitors' opportunities for solitude, or primitive and unconfined recreation in areas where recreational target shooting occurs.

Implementing nonrestrictive measures in areas adjacent to wilderness areas would still result in noise and travel impacts from motor vehicle use on designated routes adjacent to wilderness areas, resulting in localized, moderate, short-term, indirect impacts on opportunities for solitude, or primitive and unconfined recreation in the perimeter of adjacent wilderness. The indirect impacts could occur anywhere in the wilderness areas; however, the restrictions are likely to occur in areas already experiencing disturbance, such as the northern boundary of the North Maricopa Wilderness area along the El Paso Natural Gas Company pipeline road, as described above.

South Maricopa Mountains Wilderness. The direct and indirect impacts would be the same as described under North Maricopa Mountains Wilderness. The direct and indirect impacts would most likely continue next to the northern boundary along SR 238 and BLM Roads (including most sub-segment) 8038 and 8037; however, they could occur in other areas where recreational target shooting occurs.

Table Top Wilderness. The direct and indirect impacts would be the same as described under North Maricopa Mountains Wilderness. The direct and indirect

impacts would most likely continue next to the northern boundary along BLM Roads (including most sub-segment) 8022, 8023, 8024, 8042, and 8046; however, they could occur in other areas where recreational target shooting occurs.

Juan Bautista de Anza National Historic Trail

Under a continuation of current management, the BLM would manage 100 percent (486,400 acres) of the decision area, including the entire NHT corridor (7,800 acres) as available to recreational target shooting. Visitors would experience no change in opportunities to experience the historic setting of the NHT corridor.

Impacts on the Juan Bautista de Anza NHT corridor from recreational target shooting would continue to include direct loss, damage, or destruction of the physical environment of the trail corridor, including site or historic trail elements, artifacts, and associated cultural sites, as described under *Nature and Type of Effects*. This would result in site-specific to localized, long-term, moderate, direct impacts on the physical environment and historic setting.

Gunfire noise and safety concerns along, near, or crossing the NHT corridor would continue to diminish the opportunities for visitors to experience the overall sense of time and context of the NHT corridor, as described under *Nature and Type of Effects*. Gunfire noise and perceived safety risks would result in localized, short-term, moderate, direct impacts on visitor experience in the corridor.

Although the Juan Bautista de Anza NHT would be closed to OHV travel, assuming the BLM approves the SDNM Juan Bautista de Anza RMZ Recreation Plan (BLM 2016), motor vehicles would continue to be used to access recreational target shooting sites, indirectly impacting visitors' opportunities to experience the overall setting of the corridor, as described under *Nature and Type of Effects*. Vehicle noise and travel would result in localized, short-term, moderate, indirect impacts on visitor experience in the corridor. The level of impacts depends on how close motor vehicles travel next to the Juan Bautista de Anza NHT corridor, especially near the eastern and western boundaries of the SDNM.

Any potential wildfire caused by recreational target shooting that burns in the NHT corridor would indirectly impact the physical environment and landscape settings of the NHT corridor, as described under *Nature and Type of Effects*. This would result in localized, long-term negligible to moderate, indirect impacts on the physical environment and historic setting.

Monitoring and Mitigation. Implementing temporary or permanent restrictions in or adjacent to the NHT corridor would result in fewer areas of landscape disturbance from gunfire, trampling, and potential wildfires, as described under *Effects Common to All Alternatives*. The direct and indirect impacts from

restrictions could occur anywhere; however, the restrictions are likely to occur in areas already experiencing disturbance, especially in areas near the east and west Monument boundaries. Restricting areas would enhance the historic setting, resulting in site-specific to localized, negligible to minor, long-term, direct, and indirect impacts on visitors' opportunities to experience the NHT corridor's historic setting. The elimination of gunfire in restricted areas would remove noise and safety concerns in these areas, resulting in localized, negligible, short-term, direct impacts on visitors' opportunities to experience the historic setting.

If restrictions are implemented in areas adjacent to the corridor, the impacts from motor vehicle noise and travel on designated routes adjacent to the NHT corridor would be reduced, resulting in localized, minor, short-term, indirect impacts on visitors' opportunities to experience the historic setting. Motor vehicle use for other purposes would still continue. The indirect impacts could occur anywhere in the corridor; however, the restrictions are likely to occur in areas already experiencing disturbance, such as the eastern and western boundaries of the SDNM.

Implementing nonrestrictive mitigation measures could result in fewer areas of landscape disturbance from bullets, trampling, and potential wildfires, as described under *Nature and Type of Effects*. The direct and indirect impacts from these restrictions could occur anywhere in the NHT corridor; however, the measures are likely to occur in areas already experiencing disturbance, especially where vehicle routes are near the NHT corridor. Nonrestrictive measures would result in site-specific to localized, negligible to minor, long-term, direct, and indirect impacts on visitors' opportunities to experience the historic setting. However, the locations and magnitude of impacts would depend on the type of measures. Because recreational target shooting would still occur in and near the NHT corridor, gunfire and safety concerns would continue to alter visitors' experiences from noise and perceived safety, resulting in localized, short-term, moderate, direct impacts on visitors' opportunities to experience the historic setting.

Implementing nonrestrictive measures in areas adjacent to the NHT corridor would still result in noise impacts from motor vehicle use on nearby designated routes, resulting in localized, moderate, short-term, indirect impacts on opportunities to experience the historic setting. The indirect impacts could occur anywhere in the NHT corridor; however, the restrictions are likely to occur in areas already experiencing disturbance, such as the eastern and western boundaries of the SDNM.

Alternative B

Wilderness Areas

North Maricopa Mountains Wilderness. Like Alternative A, recreational target shooting in the North Maricopa Mountains Wilderness (64,200 acres) would continue to result in direct disturbance of landscapes from gunfire and trampling at recreational target shooting sites, as described under *Nature and Type of Effects*. The direct impacts on visitors' opportunities to experience natural, and untrammeled and undeveloped wilderness would be the same as described under Alternative A.

Like Alternative A, noise and safety concerns from gunfire would continue to directly alter visitors' wilderness experiences, as described under *Nature and Type of Effects*. Therefore, the impacts under Alternative B would be similar to those described under Alternative A, except the restriction along the northern boundary of the wilderness would eliminate gunfire originating in this area. This would result in localized, short-term, moderate, direct impacts on visitors' opportunities for solitude, or primitive and unconfined recreation, except in the northern perimeter of the wilderness, where direct impacts would likely be mitigated to localized, short term, and minor.

Under Alternative B, indirect impacts from noise and vehicle travel would be similar to those under Alternative A, except the restriction along the northern boundary of the wilderness would eliminate noise related to motor vehicle travel to recreational target shooting sites in that area. This would result in localized, short-term, moderate, indirect impacts on visitors' opportunities for solitude, or primitive and unconfined recreation, except in the northern perimeter of the wilderness, where impacts would likely be mitigated to localized, short term, and minor.

Indirect impacts from potential wildfires would be similar to those under Alternative A, except the restriction along the northern boundary of wilderness would eliminate the potential for wildfires from recreational target shooting in that area. This would continue to result in potential localized, long-term, negligible to moderate, indirect impacts on visitors' opportunities to experience naturalness, and untrammeled and undeveloped wilderness, except in the northern perimeter of the wilderness, where impacts would likely be mitigated to localized, long-term, and minor. The magnitude of impacts would depend on vegetation condition, fuels treatment activities, and fire suppression.

South Maricopa Mountains Wilderness. The impacts on visitors' opportunities to experience wilderness qualities would be the same as those described under Alternative A.

Table Top Wilderness. The impacts on visitors' opportunities to experience wilderness qualities would be the same as those described under Alternative A.

Monitoring and Mitigation. The impacts from restrictions and mitigation measures under Alternative B would be similar to those under Alternative A, except a restriction along the northern boundary of the North Maricopa Mountains Wilderness would already be in place. Therefore, mitigation measures would not likely be needed in this area.

Juan Bautista de Anza National Historic Trail

The impacts on the physical environment and historic landscape setting of the NHT corridor would be the same as those described under Alternative A. Recreational target shooting would continue to diminish visitors' opportunities to experience the historic landscape settings.

Monitoring and Mitigation. The impacts from restrictions and mitigation measures under Alternative B would be similar to those under Alternative A.

Alternative C

Wilderness Areas

North Maricopa Mountains Wilderness. Like Alternative A, recreational target shooting in the North Maricopa Mountains Wilderness (64,200 acres) would continue to result in direct disturbance of landscapes from gunfire and trampling at recreational target shooting sites, as described under *Nature and Type of Effects*. The direct impacts on visitors' opportunities to experience natural, and untrammeled and undeveloped wilderness would be the same as those described under Alternative A.

Like Alternative A, noise and safety concerns from gunfire would continue to directly alter visitors' wilderness experiences, as described under *Nature and Type of Effects*. Therefore, the impacts under Alternative C would be similar as described under Alternative A, except the restriction in the Juan Bautista de Anza NHT RMZ along the eastern and southern boundaries of the wilderness would eliminate gunfire originating in this area. This would result in localized, short-term, moderate, direct impacts on visitors' opportunities for solitude, or primitive and unconfined recreation, except in the eastern and southern perimeter of the wilderness that border the RMZ, where direct impacts would likely be mitigated to localized, short term, and minor.

Under Alternative C, indirect impacts from noise and travel related to motor vehicles accessing recreational target shooting sites would be similar to those under Alternative A, except the restriction in the Juan Bautista de Anza NHT RMZ along the eastern and southern boundaries of the North Maricopa Mountains Wilderness would eliminate motor vehicle travel to recreational target shooting sites in that area. This would result in localized, short-term, moderate, indirect impacts on visitors' opportunities for solitude, or primitive and unconfined recreation, except in the eastern and southern perimeter of the

wilderness, where impacts would likely be mitigated to localized, short term, and minor.

Indirect impacts from potential wildfires would be similar to those under Alternative A, except the restriction along the eastern and southern wilderness boundaries would eliminate the potential for wildfires from recreational target shooting in that area. This would continue to result in potential localized, long-term, negligible to moderate, indirect impacts on visitors' opportunities to experience naturalness, and untrammeled and undeveloped wilderness, except in the eastern and southern perimeter of the wilderness, where impacts would likely be mitigated to localized, long-term, and minor. The magnitude of impacts would depend on vegetation condition, fuels treatment activities, and fire suppression.

South Maricopa Mountains Wilderness. The impacts on visitors' opportunities to experience wilderness qualities would be the same as those described under Alternative A.

Table Top Wilderness. The impacts on visitors' opportunities to experience wilderness qualities would be the same as those described under Alternative A.

Monitoring and Mitigation. The impacts from restrictions and mitigation measures under Alternative C would be similar to those under Alternative A, except a restriction along the eastern and southern boundary of the North Maricopa Mountains Wilderness would already be in place. Therefore, mitigation measures would not likely be needed in this area.

Juan Bautista de Anza National Historic Trail

Restricting recreational target shooting in the 52,800-acre RMZ would eliminate the potential for noise, resource damage, and safety concerns in the NHT corridor. Compared with Alternative A, this alternative would result in observable improvements in protection of the physical environment and opportunities for visitors to experience the historic setting of the NHT corridor. Permanent restrictions in or adjacent to the NHT corridor would result in fewer areas of landscape disturbance, as described under *Nature and Type of Effects*. Restricting recreational target shooting within the RMZ would enhance the historic setting, resulting in localized, negligible to minor, long-term, direct, and indirect impacts on visitors' opportunities to experience the NHT corridor's historic setting.

The elimination of gunfire noise and safety concerns in these areas would result in localized, negligible, short-term, direct impacts on visitors' opportunities to experience the historic setting. The impacts from motor vehicle noise on designated routes adjacent to the NHT corridor would be reduced, resulting in localized, minor, short-term, indirect impacts on visitors' opportunities to experience the historic setting. The elimination of recreational target shooting in this area would reduce illegal dumping activity.

Motor vehicle use for other purposes would still continue. The indirect impacts could occur anywhere in the corridor; however, the restrictions are likely to occur in areas already experiencing disturbance, such as the eastern and western boundaries of the SDNM.

Monitoring and Mitigation. Because the Juan Bautista de Anza RMZ would be restricted, mitigation measures to protect the physical environment and historical context from gunfire and other recreational target shooting-related activities would not need to be implemented. There would still be a need for monitoring in this area to ensure compliance with the restriction.

Alternative D

Restricting 159,100 acres (100 percent) of the wilderness areas under Alternative D would eliminate potential direct impacts on wilderness qualities from recreational target shooting in the wilderness areas. Compared with Alternative A, Alternative D would preserve the wilderness qualities and reduce the potential for impacts on visitors' opportunities to experience wilderness qualities.

Wilderness Areas

North Maricopa Mountains Wilderness. Restricting recreational target shooting in the wilderness area would remove direct disturbance of landscapes from gunfire and trampling at recreational target shooting sites, as described under *Nature and Type of Effects*. Preservation of the landscape would result in site-specific to localized, long-term, negligible, direct impacts on visitors' opportunities to experience natural, and untrammeled and undeveloped wilderness.

Eliminating gunfire in the wilderness area and the Juan Bautista de Anza RMZ would enhance visitors' wilderness experiences by eliminating gunfire noise and perceived safety concerns, as described under *Nature and Type of Effects*. This would continue to result in localized, long-term, negligible to moderate, direct impacts on visitors' opportunities for solitude, or primitive and unconfined recreation in most of the wilderness area. However, the area to the north and west of the wilderness boundary near BLM Road 8001 would still be available for recreational target shooting. Gunfire noise and stray bullets from these areas would still occur in the northern and western perimeter of the wilderness area. Visitors' concerns for their safety from potential stray bullets would likely continue to diminish their ability to thoroughly enjoy their wilderness experience in these areas.

Recreational target shooting would continue to result in indirect impacts from motor vehicles accessing recreational target shooting sites adjacent to the northern and western wilderness boundaries, as described under *Nature and Type of Impacts*. This vehicle noise would result in localized, long-term,

moderate, indirect impacts on opportunities for solitude, or primitive and unconfined recreation in the perimeters of wilderness areas.

As described under *Nature and Type of Effects*, discharge of firearms in areas to the north and west of the wilderness area would be a potential indirect source of ignitions and potential wildfires. Like Alternative A, this would result in potential localized, long-term, negligible to moderate, indirect impacts on visitors' opportunities to experience naturalness, and untrammeled and undeveloped wilderness. The potential for recreational target shooting-related wildfires would mostly occur at locations next to the northern and western wilderness boundaries, because areas to the east and south would be restricted.

Monitoring and Mitigation. Because the wilderness area would be restricted, mitigation measures to protect the landscape from direct disturbance in the wilderness area related to recreational target shooting would not need to be implemented.

Implementing temporary or permanent restrictions in the available areas located to the north and west of the SDNM boundaries near BLM Road 8001 would result in fewer areas of landscape disturbance from potential wildfires, as described under *Effects Common to All Alternatives*. Restricting areas would enhance wilderness landscapes in the northern and western wilderness perimeters, resulting in site-specific to localized, negligible to minor, long-term, direct, and indirect impacts on visitors' opportunities to experience naturalness, and untrammeled and undeveloped wilderness.

The elimination of gunfire in the restricted areas would remove noise and safety concerns in the northern and western wilderness perimeters, resulting in localized, negligible, short-term, direct impacts on visitors' opportunities for solitude, or primitive and unconfined recreation in these areas. Restricting these areas would also remove the impacts from motor vehicle noise accessing these sites, resulting in localized, minor, short-term, indirect impacts on opportunities for solitude, or primitive and unconfined recreation in the perimeter of adjacent wilderness. Motor vehicle use for other purposes would still continue.

If monitoring identifies the need for nonrestrictive mitigation measures in the areas available for recreational target shooting outside the wilderness area, this could result in fewer areas affected by stray bullets and potential wildfires, as described under *Nature and Type of Effects*. The direct and indirect impacts from these measures are likely to occur in areas already experiencing disturbance, especially where vehicle routes intersect with wilderness boundary. Nonrestrictive measures would result in localized, negligible to minor, long-term, direct, and indirect impacts on visitors' opportunities to experience naturalness, and untrammeled and undeveloped wilderness.

Implementing nonrestrictive measures in the available areas would still result in impacts from motor vehicle use on designated routes, such as BLM Road 8001,

adjacent to wilderness areas, resulting in localized, moderate, short-term, indirect impacts on opportunities for solitude, or primitive and unconfined recreation in the perimeter of adjacent wilderness.

South Maricopa Mountains Wilderness. The direct and indirect impacts would be the same as described under North Maricopa Mountains Wilderness. The direct and indirect impacts would most likely continue next to the available areas surrounding the wilderness area. The direct and indirect impacts would most likely continue next to the northern boundary along SR 238 and BLM Roads (including most sub-segment) 8038 and 8037; however, they could occur in other areas where recreational target shooting occurs.

Table Top Wilderness. The direct and indirect impacts would be the same as those described under North Maricopa Mountains Wilderness. The direct and indirect impacts would most likely continue next to the available areas surrounding the wilderness area, including near BLM Roads (including most sub-segment) 8022, 8023, 8024, 8042, and 8046.

Juan Bautista de Anza National Historic Trail

The impacts on the physical environment and historic elements of the NHT corridor would be the same as those described under Alternative C. Visitors' opportunities to experience the historic landscape setting of the NHT corridor would be enhanced.

Alternative E

Wilderness Areas

Restricting 100 percent of the planning area under Alternative E would eliminate all direct and indirect impacts on wilderness qualities from recreational target shooting in the North Maricopa Mountains, South Maricopa Mountains, and Table Top Wilderness areas. Compared with Alternative A, Alternative E would reduce landscape disturbance from gunfire and associated activities the greatest, resulting in site-specific to localized, long-term, negligible, direct, and indirect impacts on opportunities for visitors to experience naturalness, and untrammeled and undeveloped wilderness. Restrictions in the planning area would also remove noise and safety concerns from gunfire, as well and noise from motor vehicles used by target shooters. This would result in localized, short-term, negligible to minor, direct, and indirect impacts on visitors' opportunities to experience solitude, or primitive and unconfined recreation in all of the wilderness areas. Motor vehicle use for non-recreational target shooting activities would still continue.

Monitoring and Mitigation. Because the entire planning area would be restricted, mitigation measures to protect the wilderness areas from gunfire and other recreational target shooting-related activities would not need to be implemented.

Juan Bautista de Anza National Historic Trail

Restricting 100 percent of the planning area under Alternative E would eliminate all direct and indirect impacts on the NHT corridor from recreational target shooting. Compared with Alternative A, Alternative E would reduce the threat of damage and disturbances of the physical environment from gunfire and associated activities the greatest, resulting in site-specific to localized, short- and long-term, negligible to minor, direct, and indirect impacts on opportunities for visitors to experience the historical context of the corridor. Motor vehicle use for other recreational activities would still continue.

Monitoring and Mitigation. Because the entire planning area would be restricted, mitigation measures to protect the NHT corridor from gunfire and other recreational target shooting-related activities would not need to be implemented.

4.5 Social and Economic

4.5.1 Tribal Interests

This section discusses impacts on tribal interests from the proposed alternatives in **Chapter 2**. Existing conditions are described in **Section 3.3.4**, Tribal Interests.

Native American tribal interests in the SDNM include, but may not be limited to, the preservation of ancestral archaeological sites, traditional use areas and resources, and places of religious importance. Native communities often view these resource uses as holistically interconnected with culture, tradition, and spiritual practice.

Impacts on tribal interests primarily concern the disturbance of places important to, and practices of, traditional cultural beliefs and behaviors. Types of impacts specific to resources important to tribes could include alterations of an area's setting, which might cause harm to a traditional practice. Impacts may also arise from actions that decrease tribal access to places and resources of traditional cultural importance.

Methods of Analysis

As described in **Section 3.5.1**, the BLM consults on a government-to-government basis with potentially impacted federally recognized Indian tribes to identify tribal interests and traditional use areas. Limited information is available on the locations and types of BLM-administered land and resources used by the tribes and the potential effects of BLM-authorized actions on those resources. Sensitive information concerning places of traditional cultural and religious importance is confidential and not available for public disclosure. For tribes, maintaining confidentiality and customs regarding traditional knowledge may take precedence over identifying and evaluating these resources, unless they are in imminent danger of damage or destruction. Therefore, the potential impacts of the alternatives on tribal interests can only be described broadly.

The assessment of the types and severity of impacts on places or resources of tribal interest depends on the perspective and beliefs of individual tribes. The types and severity of impacts on traditional or culturally important places and resources should only be assessed in consultation with specifically impacted tribes. The significance of impacts would be determined by Indian tribes defining what is culturally or spiritually important to them. All laws, regulations, and policies pertinent to determining impacts on tribal interests and traditional use areas (such as NHPA compliance and Executive Order 13007, Native American Sacred Sites; Executive Order 13084; and Executive Memorandum of April 29, 1994, on Government-to-Government Relations with Native American Tribal Governments) were considered and included in the impact analysis. This information was assessed against the actions proposed under each alternative in **Chapter 2**, and conclusions were drawn based on an understanding of how these types of actions may broadly affect tribal interests or increase the risk or likelihood of impacts. Comments from tribes and those concerned about impacts on cultural resources and traditional use areas were taken into account when developing the alternatives. Consultation with tribes is ongoing. There is considerable overlap in cultural resource analysis found in **Section 4.2.2**.

Indicators of impacts on tribal interests include:

- Extent and location of activities that may be incompatible with maintaining the physical integrity, setting, and qualities of historic properties, sensitive cultural resources, and traditional use areas
- Changes in access to traditionally used hunting and gathering areas and species, or traditionally used or culturally important locations
- Loss of vegetation, topographical features, and other important landscape elements that help define a special area

The analysis includes the following assumptions:

- Tribal interests include locations (sites, natural features, traditional trail corridors, resource gathering areas, and places) of traditional cultural or religious importance to Native American tribes. These types of resources may or may not be eligible for listing on the NRHP. The types of impacts, and an impact's magnitude, severity, and duration on tribal interests are best determined through tribal consultation. Due to the confidential nature of the information, the resource descriptions and impacts resulting from proposed actions may not be available as part of this EIS.
- Native Americans and other traditional communities have concerns about federal actions with potential impacts on cultural resources, ancestral sites, traditional use areas, and gathering areas for natural materials. In such cases, BLM consultation with the potentially impacted tribes and communities will identify such impacts.

- Measures that restrict activities or access to protect natural or cultural resources can provide direct and indirect protection of tribal interests from disturbance, incompatible activities, and unauthorized activities
- Intrusions to the visual, atmospheric, or aural setting can extend a considerable distance from the location of the resource
- Consultation with tribes, as an ongoing process, will continue, in order to identify any places or resources of traditional or cultural importance, and to identify impacts associated with those places and/or resources
- Protections for the range of cultural resources and historic landscapes that may be tribal interests are part of the Presidential Proclamation 7397, which designated the SDNM. Objects of the SDNM that may be relevant to tribal interests include archaeological sites, large villages, permanent habitation sites, rock art sites, lithic quarries, and prehistoric trails. Specific protection criteria include reducing threats and resolving conflicts from natural and human-caused degradation affecting the integrity of sites and settlement clusters, site condition, context, setting, stability, and capacity to yield scientific information. The Juan Bautista de Anza NHT Comprehensive Management and Use Plan has additional management goals addressing protection for trail segments, archaeological sites, ethnographic resources, adjacent properties, research, and interpretation (NPS 1996).

Nature and Type of Effects

Impacts on tribally important places and resources are difficult to quantify, primarily due to the lack of information available to federal land managers detailing the specific locations, practices, and resource types of tribal interest. Such locations, practices, and resource types of concern to tribes would be identified through consultation, relative to a specific action or actions. Likewise, the specific locations of dispersed recreational target shooting activities cannot be determined at a planning scale. Some traditional use areas may be considered historic properties under the NHPA, while others may not be eligible as historic properties, but impacts would still need to be considered by the BLM in consultation with tribes. Actions can be characterized as decreasing or increasing the risk or likelihood of impacts on places or resources of tribal interest. Those activities that would increase the risk or likelihood of these impacts may be inconsistent or incompatible with allocated cultural resource uses, existing management plans, and preservation of Monument objects as defined in the Presidential Proclamation 7397 designating the SDNM.

The nature and types of effects on traditional use areas are similar to those identified for other cultural resource types. Recreational target shooting involves surface disturbance through vehicle use, trampling, loss of ground

cover, and erosion. Any activities that would involve surface-disturbing activities could have direct and indirect impacts on cultural resources and/or traditional use areas. These impacts could include damaging, destroying, or displacing artifacts and features and introducing solid waste or hazardous materials that are out of character with historic settings or cultural uses. Damaging, displacing, or destroying ancestral sites would impact resource integrity by removing artifacts from their original context, breaking artifacts, or shifting or excavating features. Location of natural resources, such as plants or minerals, that may be used traditionally may be disturbed or destroyed. Ongoing use of areas for recreational target shooting could exacerbate existing impacts due to erosion of fragile soils and consequent expansion of currently disturbed areas.

The practice of recreational target shooting in areas of traditional tribal use could also limit access by tribes due to safety concerns. Recreational target shooting in the vicinity of a traditional place raises the possibility of inadvertent harm or damage to persons or property from ricochets or poorly managed recreational target shooting practices.

Direct impacts could occur from recreational target shooting in the vicinity of rock art from intentional or inadvertent bullet strikes and ricochet. Impacts from recreational access could include other forms of disturbance, such as unauthorized collection, illegal dumping of solid waste, inadvertent damage to site features, artifact distribution, and changes to the archaeological context from clearing and moving materials to create targets or fire rings.

Indirect impacts could include those that change the character of a property's use or physical features in a property's setting that contribute to its historic significance. Recreational target shooting generates noise and activities that could introduce visual, atmospheric, or audible elements that could diminish the integrity of the setting and the feeling of historic properties, cultural landscapes, or Native American traditional and religious use areas. These impacts, such as to a property's setting, may extend further.

Effects Common to All Alternatives

Under all alternatives, traditional use areas and objects of the SDNM with cultural value would continue to be affected by natural weathering and erosion processes. Ongoing and proposed human development and activities may also degrade the integrity of cultural resources and traditional use areas. Determining impacts that may be occurring on unknown or unrecorded resources is difficult because of limited knowledge of tribal interests, traditional use areas, or sacred sites.

The BLM would implement monitoring and mitigation strategies, which would reduce the overall potential for impacts as described under the *Nature and Type of Effects* and could decrease the intensity of incremental impacts. Mitigation measures addressing other resource values that result in temporary or permanent restrictions on recreational target shooting may provide incidental

protections for traditional use areas. Monitoring under all alternatives would determine the effectiveness of restrictions on all recreational target shooting and protect traditional use areas from impacts due to this activity within the SDNM.

Cultural resource and environmental compliance actions would continue under all alternatives and would include tribal consultation to determine the presence and potential for impacts on traditional use areas. Laws, regulations, and BLM policies would apply to implementation of any mitigation measures that would be considered federal undertakings. Compliance with Section 106 of the NHPA would result in the continued identification, evaluation, and consultation concerning identified cultural resources and historic properties within the SDNM. Potential adverse effects on historic properties would be avoided, minimized, or mitigated per Section 106 of the NHPA.

Alternative A

Under Alternative A, all areas in the SDNM would remain available for recreational target shooting. Although recreational target shooting has generally been concentrated in particular areas, this alternative would continue to make the most land available for this activity (486,400 acres in the decision area). This would correspond with the highest potential of impacts on tribal interests, sacred sites, or traditional use areas.

Dispersed recreational target shooting would create noise and potentially impact cultural or important natural features on the landscape. Target materials and illegal dumping activity, loss of vegetation, and loss of qualities and values of particular landscapes can lead to degradation of traditional use areas. Direct impacts on the Komatke Trail, a traditional trail corridor, cannot be determined currently. No physical trail traces or features have been documented. However, indirect impact on the traditional trail corridor may be realized as damage to features and landscape elements that this traditional trail and song-scape passes through. Areas that are used intensively for recreational target shooting may experience loss of certain vegetation types. Rock formations or small hills along the way may play a role in the recognition of this trail. Recreational target shooting and all of the associated activities and behaviors may impact the recognition of this trail corridor at some level.

The impacts of dispersed recreational target shooting are difficult to monitor and mitigate when resource site locations are unknown, and the activity is available throughout the SDNM. However, monitoring and mitigation under Alternative A would likely prioritize areas where this activity has historically occurred and where SDNM personnel could identify and reduce the potential for impacts in these areas. Based on assumptions that recreational target shooting would be concentrated near roads, resource impacts may be limited in areas where vehicle access is not available or beyond the edges of the wilderness areas.

Since the entire decision area would be available for recreational target shooting under Alternative A, it is possible that the BLM may need to implement mitigation measures. Applying mitigation measures that do not restrict overall recreational target shooting would reduce the potential for impacts locally if implemented to protect areas with tribal interests, sacred sites, or traditional use areas. Mitigation measures that broadly restrict recreational target shooting temporarily or permanently would result in a reduced risk of impacts on traditional use areas in those areas.

Alternative B

Under Alternative B, areas in the decision area available for recreational target shooting would be reduced by 10,100 acres relative to Alternative A. Restricted areas under Alternative B include the El Paso Natural Gas Company pipeline road, which has been a popular area for concentrated recreational target shooting use in the past. The State Road 238 corridor and the Vekol Valley Road would remain available for recreational target shooting. Although there would be fewer acres available to this activity, the proposed restricted area has been previously disturbed by recreational target shooting.

The potential for impacts under Alternative B would be similar to Alternative A throughout most of the SDNM. However, restrictions on recreational target shooting in this area may displace this activity to other areas with road access, such as the nearby Juan Bautista de Anza NHT RMZ or to other areas where the risk of impacts on the integrity and setting of tribal interests, sacred sites, or traditional use areas may increase. The Juan Bautista de Anza NHT RMZ is already heavily used for recreational activities by the recreating public. Trail resources and the associated site and landscape setting are considered Monument objects, and increased recreational target shooting, use, and access would increase the risk of impacts from surface disturbance, bullet strikes, vandalism, unauthorized collection, interference with tribal cultural uses, loss of interpretive opportunities, and the introduction of visual, atmospheric, or audible elements that could diminish the integrity of the setting and feeling of the cultural landscape or to associated traditional use areas.

Although there would be fewer acres available for this activity, the proposed restricted area has been previously disturbed by recreational target shooting. However, these activities may be displaced to other parts of the SDNM that have high concentrations of intact and sensitive cultural resources, areas of tribal interest, sacred sites, or traditional use areas. Applying mitigation measures that do not restrict recreational target shooting outside of the 10,100-acre area identified under Alternative B would reduce the potential for impacts locally if implemented to protect known, or high potential, areas important for tribes. Impacts after applying other more broad mitigation measures would be similar to those described for Alternative A, but they would likely affect a smaller area under Alternative B.

Alternative C

Under Alternative C, areas in the SDNM available for recreational target shooting would be reduced by approximately 52,800 acres by restricting this activity within the Juan Bautista de Anza NHT RMZ. The RMZ contains cultural resources, historic properties and Monument objects. This area has two petroglyph sites within its boundaries. The NHT also has additional management goals outlined in NPS's CMP addressing protection for trail segments, archaeological sites, ethnographic resources, adjacent properties, research, and interpretation (NPS 1996). These restrictions would be consistent with protection criteria for Monument objects and CMP management goals for the Juan Bautista de Anza NHT.

Alternative C would provide additional protections and reduce the risks of impacts on the integrity and settings of tribal interests, sacred sites, or traditional use areas over Alternative A. Restricting recreational target shooting in the Juan Bautista de Anza NHT RMZ could displace this activity to other areas of the SDNM, such as the Desert Back Country RMZ or the El Paso Natural Gas Company pipeline road, or to locations off of the SDNM. The potential for impacts on resources important to tribes in the SDNM would be reduced overall, but potential impacts in available areas would be similar to those under Alternative A.

Because 433,600 acres of the decision area would be available for recreational target shooting, there would likely be less recreational target shooting than under Alternative A, and none within the Juan Bautista de Anza NHT RMZ, resulting in less need to implement mitigation measures. Further, applying mitigation measures that do not restrict recreational target shooting outside of the Juan Bautista de Anza NHT RMZ would reduce the potential for impacts locally if implemented to protect other areas with known, or high potential for, resources important to tribes. Impacts after applying other broader mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative C.

Alternative D

Under Alternative D, recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ, three designated wilderness units, and one area managed to protect wilderness characteristics, totaling approximately 319,900 acres. This includes approximately 52,800 acres in the Juan Bautista de Anza NHT RMZ, approximately 159,100 acres of designated wilderness, and approximately 108,100 acres of area managed for wilderness character within the SDNM. These areas are not currently popular for recreational target shooting because of the lack of motorized vehicle access, and as a result, these areas may have a higher percentage of undisturbed cultural resources and intact settings.

Alternative D would provide additional protections and reduce the risks of impacts on the integrity and settings of tribal interest, sacred sites, or traditional use areas over Alternative A. Among the restricted areas to recreational target shooting, culturally sensitive areas and Monument objects south of I-8 in the Table Top Wilderness and other locations throughout the SDNM would be included. Restrictions on recreational target shooting would be concentrated in the areas described above; potential impacts in the approximately 166,500 acres available to recreational target shooting would be similar to those under Alternative A.

Because 66 percent of the decision area would be restricted for recreational target shooting, there would likely be less overall recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Further, applying mitigation measures that do not restrict recreational target shooting outside of these areas would reduce the potential for impacts locally if implemented to protect other areas with known, or high potential for, resources important to tribes. Impacts after applying other broader mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative D.

Alternative E

Under Alternative E, recreational target shooting would not be available in the SDNM. This would eliminate potential impacts on the integrity and settings of tribal interests, sacred sites, or traditional use areas from this as an authorized activity. Recreational target shooting would likely continue in areas outside of the SDNM. Under Alternative E, monitoring would help ensure that the proposed restriction of recreational target shooting in the SDNM would be enforced. Since the entire SDNM would be restricted to recreational target shooting, the BLM would not likely need to implement mitigation measures. Impacts from monitoring under Alternative E are described under *Effects Common to All Alternatives*.

4.5.2 Hazardous Materials and Public Safety

This section discusses impacts on hazardous materials and public safety from the proposed alternatives in **Chapter 2**. Existing conditions are described in **Section 3.5.2**, Hazardous Materials and Public Safety.

Methods of Analysis

Indicators of impacts on hazardous materials and public safety include the following:

- A change in the amount of illegal dumping in the decision area
- Risk of the public being injured by gunfire

The analysis includes the following assumptions:

- Public health and safety issues will receive priority consideration in the management of BLM-administered lands
- Illegal dumping of solid waste is not directly attributable to recreational target shooting, but areas popular for recreational target shooting have seen an increase in illegal dumping
- The risk of the public being injured by gunfire is highest in areas available to recreational target shooting and areas that receive more visitation

Nature and Type of Effects

As described in **Section 3.5.2.**, Hazardous Materials and Public Safety, illegal dumping of solid waste has been recorded in multiple areas in the SDNM. Waste includes litter left at recreation sites and along designated routes, and larger items such as appliances that are sometimes used as targets for recreational target shooting. If not addressed, illegal dumps often attract more waste, potentially including hazardous wastes, such as asbestos containing materials, household chemicals and paints, automotive fluids, and commercial or industrial wastes (US EPA 1998).

The presence of gunfire can cause visitors to seek other areas perceived as safer. Please see **Sections 4.3.2**, Recreation Management, and **4.3.3**, Recreational Target Shooting, for a discussion of shifting visitor use patterns related to restrictions on recreational target shooting.

Research on the effects of recreational target shooting on soil contamination and resulting impacts on human health in the SDNM is limited to the preliminary student-led project described in **Section 3.5.2**, Recreational Target Shooting. This study did not include an ecological risk assessment, and thus did not investigate impacts on the environment (e.g., wildlife). The results of this preliminary study merit further research, but are not suitable for to accurately identifying other possible site-specific impacts across a broader geographic area of the Monument because of the limited geographic scope and the absence of an ecological risk assessment. Given the research performed to date, including the conclusion that risks at the 15 informal recreational target shooting sites surveyed are within acceptable limits for recreational users and volunteer site cleanup workers, it is reasonable to conclude that risks from contamination on human health are currently negligible to minor. However, risks may increase over time as lead and other soil contaminants accumulate with continued recreational target shooting activity. Additional research performed by a certified risk assessor would provide better increase understanding of the impacts of soil contaminants on human health and the environment.

Effects Common to All Alternatives

Monitoring and mitigation would be common to all alternatives and would reduce the potential for dumping of solid waste. For Alternatives A through D, the BLM would implement measures to mitigate or reduce impacts based on

monitoring results. Examples include mitigation measures that temporarily restrict areas available for recreational target shooting or that allow recreational target shooting to continue while mitigating impacts (e.g., education and signage). Implementation of these strategies would reduce the potential for dumping of solid waste by increasing awareness and/or oversight of the issue or by focusing use in areas more suitable for recreational target shooting while maintaining or improving resource values. Mitigation that results in temporary or permanent restrictions on recreational target shooting would be expected to result in short- and long-term reductions, respectively, in solid waste dumping associated with recreational target shooting. Under Alternative E, monitoring would help ensure the proposed restriction of the SDNM to recreational target shooting would be enforced, and the potential for solid waste dumping associated with recreational target shooting would be reduced over the long term as visitors seeking recreational target shooting experiences would move to areas outside of the SDNM.

Alternative A

All areas in the SDNM would continue to be available for recreational target shooting, resulting in the greatest risk of being injured by gunfire over the short and long term. This is because popular destinations in the SDNM, including the Juan Bautista de Anza NHT RMZ, would continue to be available for recreational target shooting.

Instances of solid waste dumping associated with recreational target shooting would be expected to continue over the short and long term and would be concentrated at areas where waste is currently common, including along the El Paso Natural Gas Company pipeline road and smaller sites adjacent to SR 238 and Vekol Valley Road.

Implementation of mitigation measures would reduce the risk of injury from gunfire by a moderate amount by promoting safe recreational target shooting practices in safe locations. Incidences of solid waste dumping associated with recreational target shooting would likewise decline by a minor to moderate amount depending on the scale of the issue.

Impacts on human health from soil contamination at the 15 surveyed informal recreational target shooting sites would continue to be negligible to minor over the short term. Impacts on human health and the environment at all recreational target shooting sites in the SDNM may increase over the long term depending on the frequency of use and type of contamination that occurs.

Alternative B

Impacts associated with the risk of injury from gunfire would be similar to those under Alternative A, but they would be reduced in the 10,100 acres where recreational target shooting is restricted in the decision area. This restriction would have a negligible short- and long-term impact on the risk of injury, because it does not overlap any areas that receive high visitation.

There would be a moderate reduction in solid waste dumping associated with recreational target shooting, because the area where recreational target shooting would be restricted is one of the primary locations (i.e., along the El Paso Natural Gas Company pipeline road) for recreational target shooting-related dumping and litter.

Impacts from mitigation would be similar to those described under Alternative A, but they would occur over a slightly smaller area because there would be 10,100 acres restricted for recreational target shooting in the decision area where mitigation would likely not be needed.

Impacts on human health and the environment from soil contamination would be similar to those described under Alternative A, except impacts would not increase in intensity over time in the area where recreational target shooting is restricted.

Alternative C

By restricting recreational target shooting in the Juan Bautista de Anza NHT RMZ, there would be a moderate reduction in the risk of the public being injured by gunfire over the short and long term. This is because this area receives the most public visitation of any area in the SDNM.

There would be a minor reduction in solid waste dumping associated with recreational target shooting, because the area where recreational target shooting would be restricted encompasses some, but not all, of the primary locations in the SDNM where recreational target shooting-related dumping and litter has been observed.

Impacts from mitigation would be similar to those described under Alternative A, but they would occur over a smaller area because there would be 52,800 acres restricted for recreational target shooting in the decision area where mitigation would likely not be needed.

Impacts on human health and the environment from soil contamination would be similar to those described under Alternative A, except impacts would not increase in intensity over time in the area where recreational target shooting is restricted.

Alternative D

Impacts would be similar to those described under Alternative C, except that the risk of injury from gunfire would be further reduced by restricting recreational target shooting in wilderness and lands managed to protect wilderness characteristics.

Impacts on solid waste would be similar to those under Alternative C, because there is low visitation in wilderness and lands managed to protect wilderness

characteristics, and the lack of motorized access makes it difficult to introduce large volumes of waste in these areas.

Impacts from mitigation would be similar to those described under Alternative A, but they would occur over a much smaller area because there would be 320,100 acres restricted for recreational target shooting in the decision area where mitigation would likely not be needed.

Impacts on human health and the environment from soil contamination would be similar to those described under Alternative A, except impacts would not increase in intensity over time in the area where recreational target shooting is restricted.

Alternative E

Restricting recreational target shooting in the entire decision area would eliminate the risk of the public being injured by gunfire associated with recreational target shooting over the short and long term. It would also eliminate solid waste dumping associated with recreational target shooting over the short and long term. There would also be no long-term increase in impacts on human health and the environment from soil contamination.

Monitoring would help ensure the proposed restriction of the SDNM to recreational target shooting would be enforced, and the potential for solid waste dumping associated with recreational target shooting would be eliminated over the long term as visitors seeking recreational target shooting experiences would move to areas outside of the SDNM.

4.5.3 Social and Economic Conditions and Environmental Justice

Methods of Analysis

This section discusses impacts on social and economic conditions and environmental justice from the proposed alternatives summarized in **Chapter 2**. Existing conditions are described in **Section 3.5.3**, Social and Economic Conditions and Environmental Justice.

The study area includes Maricopa, Pima, and Pinal Counties.

Economic impacts are defined as expected gains or losses from market transactions on local jobs and income and the market and non-market value of resources to users. Social impacts are defined as the consequences to of a decision on human populations that may alter the way in which people live, work, recreate, relate to one another, organize, and generally cope as members of society. Social impacts also include cultural impacts involving changes to the norms, values, and beliefs that guide and rationalize people's cognition of themselves and their society.

Due to the lack of pertinent quantitative data, this economic analysis is primarily qualitative. This qualitative analysis identifies identifying the most likely direction of change in economic conditions resulting from a particular allowable use or a set of allowable uses. For example, based on the type of proposed action, a likely increase or decrease in recreation levels may be identified, or an increase or decrease in tourist expenditures in the planning area may be deemed likely. These determinations are based on the nature of the proposed action, socioeconomic characteristics of the area under study, patterns observed in other areas, and professional judgment.

Quantitative economic impact analysis requires sufficient information to quantify current conditions. It analyzes a change in the value of employment, income, or other factors resulting from a specific allowable use, management action, or set of actions. For this RMPA/EIS it was determined that, due to a lack of current quantitative information specific to recreational target shooting in the decision area (i.e., the number of recreational target shooters currently using BLM-administered lands in the planning area), quantitative analysis would not be appropriate. Similarly, use of an input/output model, such as Impact Analysis for Planning (IMPLAN), was not necessary or warranted for this analysis. IMPLAN generates estimates of the economic impacts of inter-industry purchases and consumer re-spending of income, known as the multiplier effect. This additional economic impact information can sometimes assist the BLM's decision-making process. The data that are available or reasonably attainable for the high-level economic analyses in this RMPA/EIS do not provide an adequate basis to determine differences between the management alternatives using IMPLAN; therefore, the multiplier effect is addressed qualitatively.

Social impact analysis examines impacts on specific user groups, as identified in **Chapter 3**. The analysis is written in terms of impacts on individuals or groups who are part of a particular stakeholder category. This is not meant to imply that all individuals and social groups fit neatly into categories; many specific individuals or organizations may have multiple interests and would see themselves reflected in more than one stakeholder category.

Indicators of impacts on social and economic conditions and environmental justice include the following:

- Population (growth projections)
- Level of recreational use
- Employment (by sector)
- Income (personal income)
- Ethnic and racial characteristics of the region

The analysis includes the following assumptions:

- Increased population growth will increase demand for recreational activities on adjacent public lands
- Restrictions on recreational target shooting could negatively impact local economies
- Restrictions specifically to protect special status species or habitats could reduce economic activities in the restricted areas. Measures to protect special status species or habitats, however, may contribute to long-term persistence of these unique resources and provide non-market benefits.

Environmental Justice

As discussed in **Section 3.5.3**, CEQ has issued guidelines for identifying low-income and minority populations and assessing impacts. If significant effects were to occur in any resource area and these were to disproportionately affect minority or low-income populations, there could be an environmental justice impact. Indicators include the following:

- Percentage of low-income and minority individuals
- Human health and environmental effects

Nature and Type of Effects

Recreation on BLM-administered land at the state level in 2014 was estimated to directly support 1,907 jobs and contributes $182 million in direct economic output, and 2,962 total jobs and $323 million in total economic output (direct and indirect) (BLM 2015a). Recreation plays a role in the planning area's economy, contributing directly through the purchase of access fees, special use permits, fishing and hunting licenses, and the services of local guides and outfitters, and indirectly through the purchase of commodities, such as gasoline, accommodations, and food and beverage. As discussed in **Chapter 3**, exact economic contributions from recreation in the planning area and for specific recreational uses are not known. Total economic impacts for various recreational activities are shown by county in **Table 4-29**, below.

Average trip spending also varies by activity and is not available at the county level. State level averages are displayed in **Table 4-30**, below.

Managing public lands to allow recreational target shooting results in direct and indirect economic impacts on adjacent communities. Due to lack of fees collected for dispersed recreational target shooting, direct impacts are negligible. Indirect economic impacts include spending by recreational target shooters on supplies, equipment, and trip-related expenses. As detailed in **Section 3.5.3**, the level of spending varies based on the residence of recreational users (those visiting from outside the area tend to spend more due to the need to purchase lodging and food) and the type of visit (overnight users

Table 4-29
Economic Impacts of Recreation in Socioeconomic Study Area Counties

County	Maricopa	Pima	Pinal	Arizona Total
OHV Recreation (2002)				
Full and Part time jobs	13,113	3,307	1,099	36,951
Salaries and Wages	$573 million	$112 million	$32 million	$1,455 million
Related Expenditures	$1,816 million	$443 million	$181 million	$4,087 million
Total Multiplier Effect	$2,390 million	$539 million	$204 million	$5,687 million
Hunting and Fishing (2002)				
Full and Part time jobs	5,382	1,187	296	17,190
Salaries and Wages	$137 million	$24 million	$5.3 million	$420 million
Related Expenditures	$547 million	$113 million	$26 million	$1282 million
Total Multiplier Effect	$687 million	$140 million	$31 million	$1,792 million
Non-Consumptive Wildlife Related Recreation (2002)				
Full and Part time jobs	956	357	77	15,058
Salaries and Wages	$29 million	$11.2 million	$4.7 million	$573 million
Related Expenditures	$57 million	$21 million	$2.4 million	$1,098 million
Total Multiplier Effect	$108 million	$40.7 million	$8.8 million	NA
Recreational Target Shooting (2011)				
Full and Part time jobs	NA	NA	NA	3,422
Salaries and Wages	NA	NA	NA	$135 million
Related Expenditures	NA	NA	NA	$227 million
Total Multiplier Effect	NA	NA	NA	$391 million

Source: Arizona Department of Fish and Game 2003a, 2003b, 2003c; Southwick and Associates 2013
Converted to $2016 using BLS CPI converter (BLS 2015)

Table 4-30
Average Spending by Activity

County	Fishing (2011)	Hunting (2011)	Wildlife Watching (2011)	Recreational Target Shooting (2013)
Average annual expenditure per participant – AZ residents and non-residents	$1,269	$1,189	$623	$527
Average trip expenditures per day – AZ residents and non-residents	$79	$60	$35	NA

Source: USFWS 2011; Southwick and Associates 2013
Converted to $2016 using BLS CPI converter (BLS 2015)

tend to spend more than day users regardless of their location of residence). In addition, spending by target shooters results in additional economic impacts in the local economy, a concept known as the multiplier effect. For example, the salaries of employees in local sporting goods shops are then spent in the local economy.

Certain segments of the public consider dispersed recreational target shooting to be important, both socially and economically. Monetary expenditures,

however, probably do not represent "new" money being introduced into local economies. It is probable that if dispersed recreational target shooting opportunities on BLM-administered lands were not available, residents would participate in other locally based recreation activities, keeping any monetary expenditures in the local economy. For example, a survey of recreational target shooters in the Tucson basin area found that target shooters wanted recreational target shooting opportunities within a 15- to 30-minute drive from home but were willing to drive further for specialized target shooting opportunities (US Institute for Environmental Conflict Resolution 2006). It is likely that the RMPA/EIS planning area supports both local residents and those traveling from outside the three-county area for recreational target shooting opportunities, although the specific proportion of each type of user is not known. The degree to which restriction of recreational target shooting on BLM-administered lands in the study area would result in impacts on the local market economy is dependent on both local area residents finding alternative locations for recreational target shooting, and the level at which non-resident target shooters continue to use the study area, relative to any dispersed recreational target shooting restrictions. Jobs and income associated with recreation do not capture the entire value of the experience held by recreation users within the planning area. This is because changes in the availability of recreational target shooting can also result in social impacts, including the loss of opportunity to participate in an activity that has special value for some area residents and represents a historic land use in the area. However, a lack of focused management for recreational target shooting may also impact the target shooters' experience. For example, a survey of recreational target shooters in five states, including Arizona, indicated that there is agreement among recreational target shooters that recreational target shooting debris and other litter at recreational target shooting areas and ranges on federal lands impacts their experience and supports continued irresponsible and unsafe behavior (Responsive Management 2008).

In addition, changes to recreational target shooting management may result in increased or decreased conflicts with other land uses in the planning area, and related changes to the social and economic impacts from these land uses. Of particular note is the potential for conflicts with other recreational user groups. Conflicts can be loosely grouped into two categories, including goal interference conflicts, in which the behavior(s) of an individual or group are perceived to be inappropriate (i.e., seeing someone shoot a sign or seeing a sign with bullet holes already in it) (Jacob and Schreyer 1980), or as a conflict of social values, in which conflicts occur by knowing that others who hold different social values are using an area (i.e., those who oppose gun use knowing that recreational target shooting is occurring in the area) (Carothers et al, 2001; Vaske et al. 1995; and Vaske et al. 2007). Some examples of goal interference impacts in the planning area include noise from recreational target shooting impacting those who value a quiet recreational setting and household waste left at recreational target shooting areas impacting those who value a pristine environment for

recreational activities. Additional analysis of impacts on recreational opportunities and experiences is included in **Section 4.3.2**, Recreation Management. In terms of social values conflict, simply knowing that recreational target shooting occurs in the planning area may be enough for social value conflicts to emerge (Morgan et al. 2007). Impacts on social or economic conditions would occur when such conflicts altered a visitor's experience to the extent that they change the level of their use and their related spending levels in the local economy. Different recreational activities result in varying degrees of spending, as shown in the tables above; therefore, varying the levels of participation in different recreational activities in the planning area can impact total recreational spending.

Potential impacts on the stakeholder groups identified in **Chapter 3** would vary based on the values important to these users. Continuing to make recreational target shooting available in the planning area would generally support values for recreational target shooters and local businesses supporting this activity, including access to traditional activities and economic support, resulting in no or negligible impacts on these user groups. Conversely, continued recreational target shooting would be in conflict with some values for other recreational users and for conservation-minded users who value less developed uses, resulting in minor to moderate impacts on these groups. Continued recreational target shooting on BLM-administered lands may also result in minor or moderate impacts on adjacent land owners, because of the potential for property damage or trespass. In contrast, restricting recreational target shooting would be in conflict with values important to recreational target shooters and business supporting these activities, and could result in minor to major social and economic impacts on these groups. Restricting recreational target shooting would support values held by other recreational users and particularly for conservation-minded users, reducing impacts from recreational target shooting on these groups by a corresponding amount. Restricting recreational target shooting could have varying impacts on adjacent landowners because restrictions could reduce the overall level of recreational target shooting and potential for impacts but may increase the potential for trespass for individuals seeking alternative locations for recreational target shooting.

As discussed in **Section 3.5.3**, no low-income or minority populations were identified in the planning area at the county level as defined by CEQ guidelines. At the community level, the key communities of Ajo, Gila Bend, and Phoenix contain low-income or minority populations based on CEQ guidelines. As discussed in **Section 4.5.1**, Tribal Interests, dispersed recreational target shooting could restrict the ability of some tribes to engage in traditional cultural practices or to visit traditional cultural places. Possible damage to such places and resources was also discussed as an issue. Since sacred or traditional places and resources are unique to tribal communities in the planning area, and such places have been previously identified in the SDNM, tribes may be subject to a

disproportionate and adverse impact from dispersed recreational target shooting. These impacts are analyzed under each alternative in this section.

Effects Common to All Alternatives

Given the increasing urbanization in the three-county analysis area and the increasing demand for recreation, overall visitation to the SDNM from local and regional residents may reasonably be expected to increase under all alternatives. The level and type of visitation would continue to be influenced by other factors such as national economic and travel trends. With increased recreation, there would be greater economic impacts on jobs and labor income and social impacts, as described below. Under all alternatives, recreational target shooting represents a minor contribution to the economy of planning area communities. This is because a relatively small number of jobs are supported by recreational target shooting in the socioeconomic study area. Should management become more restrictive on BLM-administered lands in the planning area, recreational target shooting may shift to other BLM-administered lands or other private or state lands; the level of participation in this activity in the study area is unlikely to decrease dramatically. Overall, short- and long-term economic impacts in the socioeconomic study area would be minor.

Under all alternatives, wilderness areas and lands managed to protect wilderness characteristics (covering 267,200 acres, or 55 percent of the decision area), would continue to be less popular areas for recreational target shooting because there is no motorized vehicle access. There would be negligible impacts on recreational target shooting and associated economic impacts from management within these areas.

Under all alternatives, the BLM would monitor the impacts from recreational target shooting and apply mitigation measures as appropriate. One outcome of monitoring could be mitigation measures that do not result in additional areas being restricted to recreational target shooting. Such measures could include increased educational efforts, regulatory signing, law enforcement presence, or physical remediation of impacts. Increased education, signing, or law enforcement would likely result in a reduction in conflicts between recreational target shooting and other uses and may therefore support recreational spending and non-market values for all uses. The effectiveness of such measures, however, is likely to vary on a site-specific basis, and some level of conflict is likely to remain. In contrast, implementing mitigation measures that result in additional temporary or permanent restrictions on recreational target shooting would result in decreased recreational target shooting in the planning area, with potential reduction in economic output from this activity. The level of impacts would vary based on the ability of target shooters to find alternative locations, as discussed under *Nature and Type of Effects*. However, the recreational experience may be improved for other recreational activities, supporting continued or increased use and associated spending from these activities. The exact location and type of mitigation measures employed for recreational target

shooting would vary under Alternatives A through D and the impacts are discussed below. Under Alternative E, monitoring would help ensure that proposed restriction of the SDNM for recreational target shooting would be enforced. Recreational target shooters would be required to seek out locations outside of the SDNM, with potential for minor reduced contributions to local economies from this activity. However, ensuring restrictions remain in effect would support use and spending from other activities that may currently conflict with recreational target shooting.

Human health and environmental effects are analyzed in **Section 4.5.2**, Hazardous Materials and Public Safety.

Under all alternatives, proposed management actions are not anticipated to result in disproportionate adverse impacts on low-income and minority populations identified in Ajo, Gila Bend, and Phoenix. This is due to the fact that changes in the level of recreational shooting would result in dispersed impacts throughout the local area on all communities and populations.

Alternative A

Under Alternative A, the entire decision area would remain available to recreational target shooting. As a result, recreational target shooting would continue to contribute directly and indirectly to the planning area economy as discussed under *Nature and Type of Effects*. Due to a lack of data on the current level of recreational target shooting and associated expenditures, quantitative analysis for economic contributions cannot be provided. However, with the level of recreation, including recreational target shooting, predicted to increase in the area as the population increases, the level of economic contributions can be expected to increase.

Issues related to recreational target shooting raised during public scoping include household waste and deteriorating resource conditions in areas with recreational target shooting as well as public safety concerns. These could be expected to increase as participation increases. Associated social effects, such as conflicts among users, would continue and possibly escalate. Should these issues continue, recreational experiences, particularly those that value natural landscapes and viewsheds, would be increasingly impacted by recreational target shooting. As a result, visitation and related spending by hikers, sightseers, and other recreation users may decline. Conflicts with other users would be greatest where recreational target shooting occurs near developed recreation sites (e.g., campgrounds, trails and trailheads, and parking areas) and in heavily visited areas.

Social impacts for identified groups (see **Section 3.5.3**) would vary based on the values identified as important by these groups, as discussed under *Nature and Type of Effects*. Recreational target shooters would be expected to benefit over the long term because recreational target shooting would be allowed in the entire SDNM. Other recreation users and conservation-minded users may

be negatively affected due to noise, safety concerns, and resource damage associated with recreational target shooting.

Continuing to manage the entire SDNM as available for dispersed recreational target shooting could restrict the ability of some tribes to engage in traditional cultural practices or visit traditional cultural places. These impacts would occur throughout the SDNM where such practices occur or traditional cultural places are located. Given the scale and frequency of recreational target shooting in the SDNM, effects would be greater than under any other alternative. Impacts would be addressed through continued tribal consultation and implementation of mitigation measures described in **Appendix B**.

Mitigation measures that result in areas continuing to be managed as available for recreational target shooting would support continued economic contributions from this resource but could impact contributions from other activities, as discussed under *Effects Common to all Alternatives*.

Mitigation that results in areas being temporarily or permanently restricted for recreational target shooting could reduce economic contributions from this activity but support increased use and economic contributions from other activities, as discussed under *Effects Common to all Alternatives*. Mitigation measures would be most effective at minimizing impacts on other recreational activities and experiences in areas frequented by recreational target shooting and other recreationists, such as along El Paso Natural Gas Company pipeline road, SR 238, BLM Road 8001, along the Juan Bautista de Anza NHT, and at developed recreation sites in the Juan Bautista de Anza NHT RMZ.

Alternative B

Alternative B would result in similar impacts as described under Alternative A, except that 10,100 acres (2 percent) of the decision area north of the North Maricopa Mountains Wilderness would be permanently restricted to recreational target shooting. Although this area represents a small percentage of the SDNM, it covers an area currently popular for recreational target shooting because of good motor vehicle access and proximity to population areas. Therefore, there is potential for minor economic impacts, as discussed under *Nature and Type of Effects*. Opportunities for recreational target shooting would remain available in other portions of the planning area, lessening overall impacts if displaced target shooters engage in recreational target shooting in these areas. In addition, restrictions on recreational target shooting would enhance opportunities and social and economic contributions from other activities, as discussed under *Nature and Type of Effects*.

Impacts from monitoring and mitigation would be similar to Alternative A, but would only apply to areas managed as available for recreational target shooting. Mitigation measures that do not restrict recreational target shooting would preserve recreational target shooting opportunities, as well as opportunities for other uses; the types of impacts from these measures are the same as described

under *Effects Comment to All Alternatives*. Temporary or permanent restrictions would further reduce opportunities for recreational target shooting in the SDNM and may force target shooters to go elsewhere, resulting in social and economic impacts. The intensity of impacts would depend upon the location of the restricted areas and the duration of the restrictions. As under Alternative A, restricting recreational target shooting may provide additional opportunities for other recreational uses and associated social and economic impacts.

Social impacts for identified groups (see **Section 3.5.3**) would vary based on the values held to be important by these groups, as discussed under *Nature and Type of Effects*. Recreational target shooters would be expected to benefit over the long term because recreational target shooting would be allowed in 98 percent of SDNM. However, the restriction of 10,100 acres that are popular for recreational target shooting would adversely affect this group in this localized area. Other recreation users and conservation-minded users may be negatively affected due to noise, safety concerns, and resource damage associated with recreational target shooting. The 10,100-acre restriction area would likely provide limited benefit for these groups, as only 2 percent of the SDNM would be restricted for recreational target shooting.

Compared with Alternative A, there would be a negligible improvement in tribes' ability to engage in traditional cultural practices or visit traditional cultural places under Alternative B because a small area (10,100 acres) would be restricted for recreational target shooting. Impacts would be addressed through continued tribal consultation and implementation of mitigation measures described in **Appendix B**.

Alternative C

Under Alternative C, recreational target shooting would be restricted in the 52,800-acre Juan Bautista de Anza NHT RMZ (11 percent of the decision area) but would be maintained elsewhere, including popular areas along El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001 in the northwestern portion of the SDNM. Alternative C would result in minor impacts on recreational target shooting opportunities and related social and economic impacts compared with Alternative A, because several easily accessible areas would remain available. Additionally, making portions of the planning area restricted to recreational target shooting would support enhancement of recreational experiences for other activities and economic and social contributions from these uses as discussed under *Nature and Type of Effects*. Additional analysis of the impacts on other users in the Juan Bautista de Anza NHT RMZ is provided in **Section 4.3.2**, Recreation Management.

Mitigation measures that maintain recreational target shooting would preserve recreational target shooting opportunities and associated social and economic impacts. More stringent measures would likely result in target shooters

preferring to go elsewhere (both in and out of the SDNM). The level of impacts would depend on the location and nature of mitigation.

Temporary or permanent restrictions, especially if imposed at popular recreational target shooting areas, would eliminate opportunities over the short or long term and result in minor impacts on economic and social contributions from this activity. The extent and duration of the impact would depend on the location and size of the restricted area and duration of the restriction.

Social impacts for identified groups (see **Section 3.5.3**) would vary based on the values held to be important by these groups, as discussed under *Nature and Type of Effects*. Recreational target shooters would be negatively affected by losing opportunities for recreational target shooting on 52,800 acres over the long term. Other recreation users and conservation-minded users may benefit from a reduction in noise, safety concerns, and resource damage associated with recreational target shooting in this area. Impacts in the rest of the SDNM would be the same as those described under Alternative A.

Compared with Alternative A, tribes' ability to engage in traditional cultural practices or visit traditional cultural places would be improved under Alternative C because 52,800 acres in the Anza RMZ would be restricted for recreational target shooting. Impacts would be addressed through continued tribal consultation and implementation of mitigation measures described in **Appendix B**.

Alternative D

Alternative D would restrict recreational target shooting on 319,900 acres (66 percent of the decision area), including wilderness areas, lands managed to protect wilderness characteristics, and the Juan Bautista de Anza NHT RMZ. Although Alternative D would increase the portion of the SDNM restricted to recreational target shooting, impacts would be similar to those described under Alternative C. This is because wilderness areas and lands managed to protect wilderness characteristics prohibit motorized vehicle access and are therefore not commonly used for recreational target shooting, and because other recreational target shooting opportunities would be maintained within the planning area. As under Alternative B, restrictions on recreational target shooting would enhance opportunities and social and economic contributions from other activities.

Impacts from monitoring and mitigation would be the same as Alternative C.

Social impacts for identified groups (see **Section 3.5.3**) would vary based on the values held to be important by these groups, as discussed under *Nature and Type of Effects*. Recreational target shooters would be negatively affected by losing opportunities for recreational target shooting on 319,900 acres over the long term, though some of these areas (e.g., wilderness areas) are not popular for recreational target shooting and are less valuable to this group than more

easily-accessible areas. Other recreation users and conservation-minded users may benefit from a reduction in noise, safety concerns, and resource damage associated with recreational target shooting in the restriction area. Impacts in the rest of the SDNM would be the same as those described under Alternative A.

Compared with Alternative A, tribes' ability to engage in traditional cultural practices or visit traditional cultural places would be improved under Alternative D because 319,900 acres would be restricted for recreational target shooting. Impacts would be addressed through continued tribal consultation and implementation of mitigation measures described in **Appendix B**.

Alternative E

Under Alternative E, the entire decision area would become restricted to recreational target shooting. As a result, recreational target shooters would be required to find a substitute area for this activity outside of the SDNM, with potential minor economic impacts if some recreational target shooters stop engaging in this recreational activity. As discussed under *Nature and Type of Effects*, the intensity of social and economic impacts would be determined by target shooters moving to and enjoying alternative locations for recreational target shooting in the socioeconomic study area (e.g., Palo Verde Hills, Seven-Mile Mountain, and the Sierra Estrella). In addition, as discussed under *Nature and Type of Effects,* restricting recreational target shooting in the SDNM would support enhanced recreational experiences for other users who have conflicts with recreational target shooting, resulting in economic and social contributions from these activities.

The impact of recreational target shooting on tribes' ability to engage in traditional cultural practices or visit traditional cultural places in the SDNM would be eliminated under Alternative E.

4.6 Unavoidable Adverse Impacts

Section 102(C) of NEPA requires disclosure of any adverse environmental effects that cannot be avoided should the proposal be implemented. Unavoidable adverse impacts are those that remain following the implementation of mitigation measures or impacts for which there are no mitigation measures. Some unavoidable adverse impacts occur because of implementing the RMPA. Others are a result of public use of the decision area lands. This section summarizes major unavoidable impacts; discussions of the impacts of each allowable use (in the discussion of alternatives) provide greater information on specific unavoidable impacts.

Surface-disturbing activities would result in unavoidable adverse impacts under current BLM policy to foster multiple uses. Although these impacts would be mitigated to the extent possible, unavoidable damage would be inevitable. For example, there would continue to be surface disturbance associated with recreational activities in the SDNM (see **Section 3.3.2**, Recreation

Management, for a discussion of inventoried recreation sites and associated disturbance).

Under Alternatives A through D, all or a portion of the SDNM would continue to be available for recreational target shooting. Even with implementation of mitigation measures, there would be impacts on soil and other resources from ammunition and the placement of targets. There would also be the potential for wildfire via human-caused ignitions from recreational target shooting.

Unavoidable damage to cultural resources from available activities could occur if resources undetected during surveys were identified during ground-disturbing activities or recreational events. Rock art or other cultural resources could continue to be inadvertently shot and damaged or destroyed. The 2012 RMP contains measures to help minimize adverse impacts on cultural resources from other activities.

As recreation demand increases, recreation use would disperse, increasing the likelihood of incompatible uses as more users compete for a limited amount of space. In areas where development activities would be greater, the potential for displaced users would increase.

4.7 Irreversible and Irretrievable Commitment of Resources

Section 102(C) of NEPA requires a discussion of any irreversible or irretrievable commitments of resources that are involved in the proposal should it be implemented. An irretrievable commitment of a resource is one in which the resource or its use is lost for a period of time (e.g., extraction of any locatable mineral ore or oil and gas). An irreversible commitment of a resource is one that cannot be reversed (e.g., the extinction of a species or disturbance to protected cultural resources). The air quality resource in the planning area is not irreversible or irretrievable.

Implementing Alternatives A through D would result in surface disturbance associated with recreational target shooting, which results in a commitment to the loss of irreversible or irretrievable resources. Although new soil can develop, soil development is a slow process in many parts of the planning area. Soil erosion or the loss of productivity and soil structure might be considered irreversible commitments of resources. Surface-disturbing activities, therefore, would remove vegetation and accelerate erosion that would contribute to irreversible soil loss. However, mitigation measures in this RMPA and the 2012 RMP are intended to reduce the magnitude of these impacts and restore some of the soil and vegetation lost. Primarily because of the number of acres available for recreational target shooting, such disturbances would occur to the greatest degree under Alternatives A and B, with less disturbance expected under Alternatives C and D.

Cultural resources, such as petroglyphs, can be irreversibly damaged by irresponsible recreational target shooting. These impacts would not be

anticipated in areas where recreational target shooting is restricted, and the BLM would continue to implement avoidance measures via proactive education and outreach to promote responsible shooting practices that would not degrade cultural resources.

4.8 Relationship Between Local Short-term Uses and Long-term Productivity

Section 102(C) of NEPA requires discussion of the relationship between local, short-term uses of the human environment and the maintenance and enhancement of long-term productivity of resources. As described in the introduction to this chapter, "short term" is defined as anticipated to occur within 5 years of the activity's implementation. "Long term" is defined as following the first 5 years of implementation but within the life of the RMPA (anticipated to be 20 years).

Short-term use of an area to foster recreational target shooting opportunities could impair the long-term productivity of soil, vegetation, and wildlife resources that are disturbed by the noise and surface disturbance associated with recreational target shooting. Impacts would persist as long as surface disturbance and noise continue. In general, the loss of soil productivity would be directly at the point where ammunition is deposited, although long-term wildlife habitat value could be reduced over a larger area due to the effects of noise. Alternative E would provide the greatest long-term productivity by restricting recreational target shooting across the entire decision area.

Chapter 5

TABLE OF CONTENTS

Chapter Page

5. CUMULATIVE EFFECTS 5-1

5.1 Introduction 5-1
5.1.1 Cumulative Analysis Methodology 5-1
5.1.2 Past, Present, and Reasonably Foreseeable Future Actions 5-6
5.2 Resources 5-9
5.2.1 Air Quality 5-9
5.2.2 Cultural and Heritage Resources 5-12
5.2.3 Priority Wildlife Species and Habitat 5-17
5.2.4 Soil Resources 5-24
5.2.5 Vegetation 5-27
5.2.6 Water Resources 5-31
5.2.7 Lands with Wilderness Characteristics 5-33
5.2.8 Wildfire Management 5-35
5.3 Resource Uses 5-42
5.3.1 Livestock Grazing 5-42
5.3.2 Recreation Management 5-43
5.3.3 Recreational Target Shooting 5-50
5.3.4 Travel Management 5-54
5.4 Special Designations 5-56
5.4.1 National Conservation Lands 5-56
5.4.2 Congressional Designations 5-57
5.5 Social and Economic 5-65
5.5.1 Tribal Interests 5-65
5.5.2 Hazardous Materials and Public Safety 5-71
5.5.3 Social and Economic Conditions and Environmental Justice 5-73

TABLES

Page

5-1 Spatial Boundary of Cumulative Impacts Analysis 5-2
5-2 Summary of Cumulative Impacts on Priority Wildlife Species and Habitat 5-24
5-3 Sonoran Desert National Monument Objects 5-57

FIGURES

Page

5-1 Cumulative Impact Analysis Geographic Boundary for Majority of SDNM Resources 5-3
5-2 Cumulative Impact Analysis Geographic Boundary for Watershed Resources 5-4
5-3 Cumulative Impact Analysis Geographic Boundary for Livestock Grazing 5-5

This page intentionally left blank.

CHAPTER 5
CUMULATIVE EFFECTS

5.1 INTRODUCTION

A cumulative effect is defined under NEPA as "the change in the environment which results from the incremental impact of the action, decision, or project when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other action." "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR, Part 1508.7). Past, present, and reasonably foreseeable future actions are analyzed to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the alternatives may have an additive, countervailing, or synergistic relationship to those effects.

5.1.1 Cumulative Analysis Methodology

The cumulative impacts discussion that follows considers the alternatives in the context of the broader human environment—specifically, actions that occur outside the scope and geographic area covered by the RMPA. The cumulative impact analysis is limited to important issues of national, regional, or local significance.

Because of the programmatic nature of an RMPA and the cumulative assessment, the analysis tends to be broad and generalized to address the incremental impact of each alternative when added to other past, present, and reasonably foreseeable future actions. Consequently, this assessment is primarily qualitative for most resources because of lack of detailed information that would result from project-level decisions and other activities or projects. Quantitative information is used whenever available and as appropriate to portray the magnitude of an impact. The analysis assesses the magnitude of cumulative impacts by comparing the environment in its baseline condition with the expected impacts of the alternatives and other actions in the same geographic area. The magnitude of an impact is defined in **Section 4.1**.

The following factors were considered in this cumulative impact assessment:

- Federal, nonfederal, and private actions
- The potential for synergistic effects or synergistic interaction among or between effects
- The potential for effects to cross political and administrative boundaries
- Other spatial and temporal characteristics of each affected resource
- A comparative scale of cumulative impacts across alternatives

Spatial and temporal boundaries used in the cumulative analysis are developed on the basis of resources of concern and actions that might contribute to an impact. The spatial boundaries vary by resource and are summarized in **Table 5-1** and displayed in **Figure 5-1** to **Figure 5-3**. The baseline date for the cumulative impacts analysis is 2016. The temporal scope of this analysis is the life of the RMPA, which encompasses a 20-year planning period.

Table 5-1
Spatial Boundary of Cumulative Impacts Analysis

Resource Section	Acres	Description
Air Quality, Congressional Designations (Wilderness Areas), and Social and Economic Conditions and Environmental Justice (see **Figure 5-1**)	15,217,000	Maricopa, Pima, and Pinal Counties
Cultural and Heritage Resources, Priority Wildlife Species and Habitat, Soil Resources, Lands with Wilderness Characteristics, Recreation Management, Recreational Target Shooting, Travel Management, Congressional Designations (National Historic Trails), Tribal Interests, and Hazardous Materials and Public Safety (see **Figure 5-1**)	1,569,900	The SDNM and all lands within 10 miles of the SDNM boundary
Vegetation, Water Resources, and Wildfire Management (see **Figure 5-2**)	1,378,500	The SDNM and the watershed boundaries that overlap and extend beyond the SDNM boundary
Livestock Grazing (see **Figure 5-3**)	448,600	All permitted allotments in and overlapping the SDNM

Source: BLM GIS 2016

Figure 5-1
Cumulative Impact Analysis Geographic Boundary for Majority of SDNM Resources

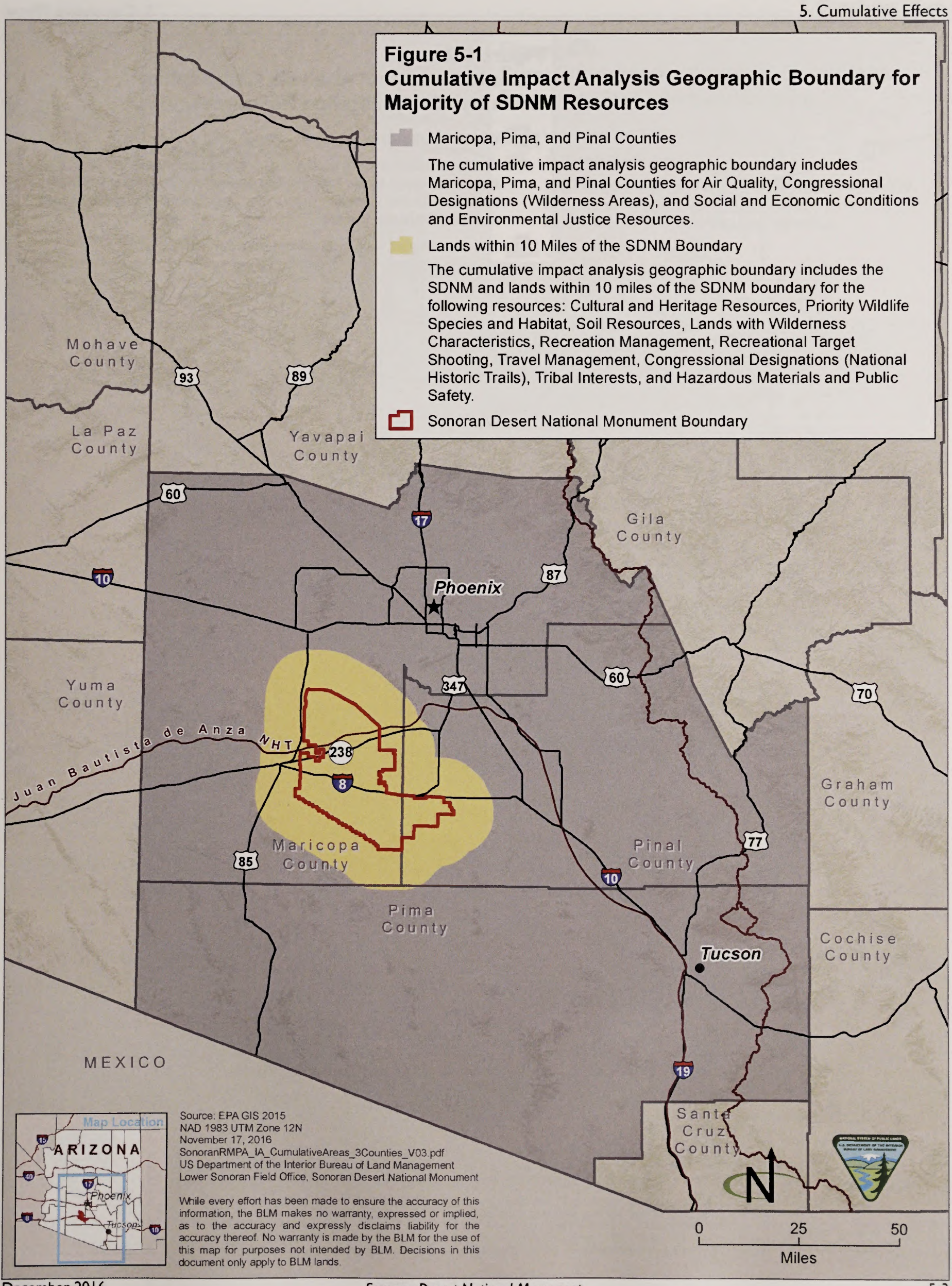
Maricopa, Pima, and Pinal Counties

The cumulative impact analysis geographic boundary includes Maricopa, Pima, and Pinal Counties for Air Quality, Congressional Designations (Wilderness Areas), and Social and Economic Conditions and Environmental Justice Resources.

Lands within 10 Miles of the SDNM Boundary

The cumulative impact analysis geographic boundary includes the SDNM and lands within 10 miles of the SDNM boundary for the following resources: Cultural and Heritage Resources, Priority Wildlife Species and Habitat, Soil Resources, Lands with Wilderness Characteristics, Recreation Management, Recreational Target Shooting, Travel Management, Congressional Designations (National Historic Trails), Tribal Interests, and Hazardous Materials and Public Safety.

Sonoran Desert National Monument Boundary



Source: EPA GIS 2015
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_IA_CumulativeAreas_3Counties_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

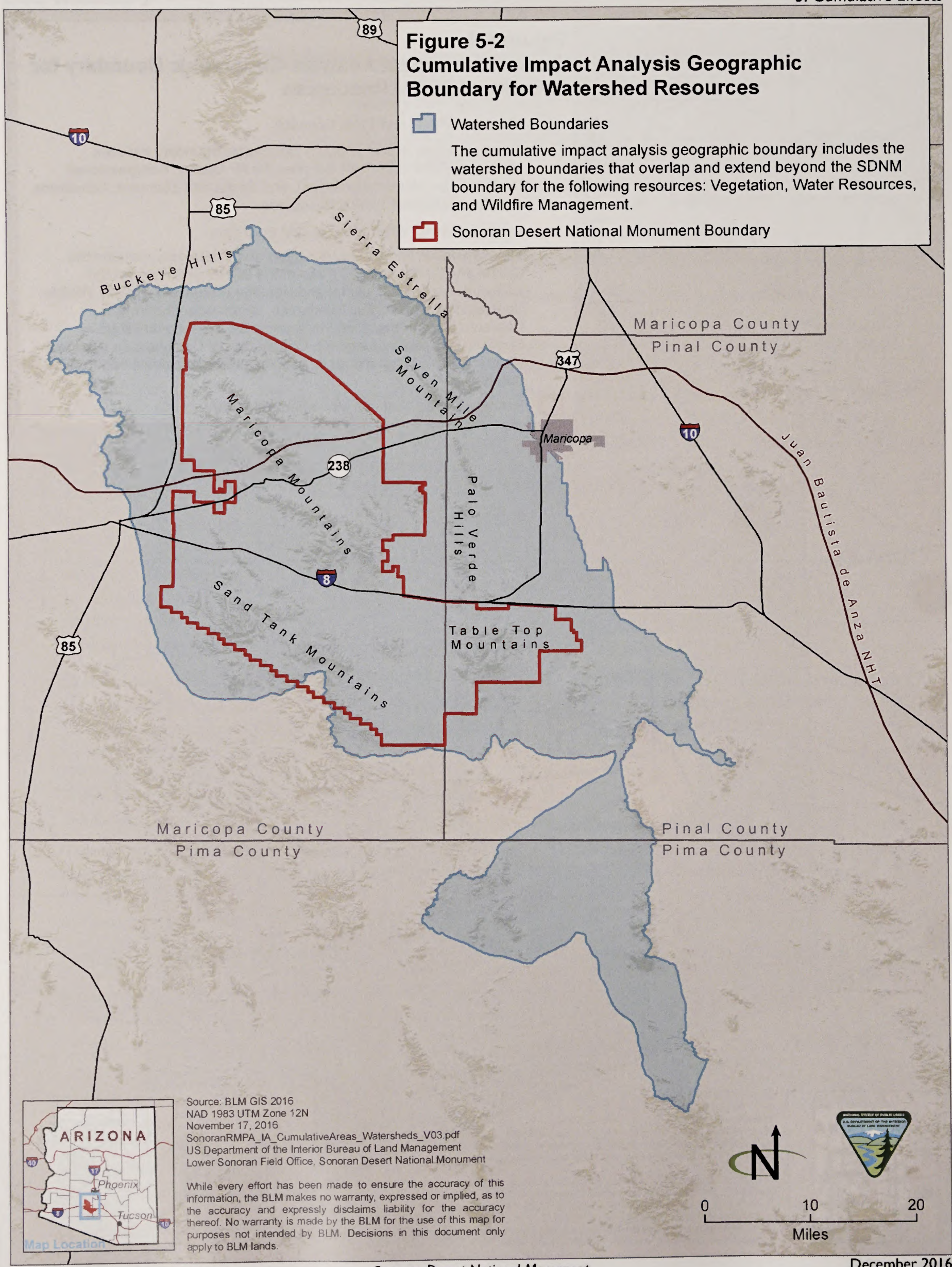
While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

Figure 5-2
Cumulative Impact Analysis Geographic Boundary for Watershed Resources

Watershed Boundaries

The cumulative impact analysis geographic boundary includes the watershed boundaries that overlap and extend beyond the SDNM boundary for the following resources: Vegetation, Water Resources, and Wildfire Management.

Sonoran Desert National Monument Boundary



Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_IA_CumulativeAreas_Watersheds_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

Figure 5-3
Cumulative Impact Analysis Geographic Boundary for Livestock Grazing

Livestock Grazing Allotment

Available for Grazing

The cumulative impact analysis geographic boundary includes all available allotments in and overlapping the SDNM for the Livestock Grazing resource.

Unavailable for Grazing

Sonoran Desert National Monument Boundary

Roads, Primitive Roads, and Trails

Perryville
Avondale
Liberty
Buckeye
Hassayampa
Arlington
Komatke
Arnold
Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
85
Beloat
Hazen
Conley
Juan Bautista de Anza NHT
Mobile
238
Maricopa County
Pinal County
Maricopa
Bosque
Big Horn
Lower Vekol
347
Stanfield
84
Big Horn
8
Freeman
Unallotted
Vekol
Table Top
Santa Rosa
South Vekol



Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_IA_CumulativeAreas_Grazing_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 6 12
Miles

5.1.2 Past, Present, and Reasonably Foreseeable Future Actions

Past, present, and reasonably foreseeable future actions are considered in the analysis to identify whether and to what extent the environment has been degraded or enhanced, whether ongoing activities are causing impacts, and trends for activities in and impacts on the area. Projects and activities are evaluated on the basis of proximity, connection to the same environmental systems, potential for subsequent impacts or activity, similar impacts, the likelihood a project will occur, and whether the project is reasonably foreseeable.

Projects and activities considered in the cumulative analysis were identified through meetings held with cooperators, the public, and BLM employees with local knowledge of the area. Additional information was obtained through discussions with agency officials and review of publicly available materials and websites.

Effects of past actions and activities are manifested in the current condition of the resources, as described in the affected environment (see **Chapter 3**). Reasonably foreseeable future actions are actions that have been committed to or known proposals that could take place within the 20-year planning period.

Reasonably foreseeable future action scenarios are projections made to predict future impacts. They are not actual planning decisions or resource commitments. Projections, which have been developed for analytical purposes only, are based on current conditions and trends and represent a best professional estimate. Unforeseen changes in factors such as economics, demand, and federal, state, and local laws and policies could result in different outcomes than those projected in this analysis.

Other potential reasonably foreseeable future actions have been considered and eliminated from further analysis, because there is a small likelihood these actions would be pursued and implemented within the life of the plan or because so little is known about the potential action that formulating an analysis of impacts is premature. In addition, potential future actions protective of the environment (such as new potential threatened or endangered species listings or regulations related to fugitive dust emissions) have less likelihood of creating major environmental consequences alone, or in combination with this planning effort. Federal actions such as species listing could require the BLM to reconsider decisions created from this RMPA, because the consultations and relative impacts might no longer be appropriate. These potential future actions may have greater capacity to affect resource uses within the planning area; however, until more information is developed, no reasonable estimation of impacts could be developed.

Data on the precise locations and overall extent of resources within the planning area are considerable, although the information varies according to resource type and locale. Furthermore, understanding of the impacts on and the

interplay among these resources is evolving. As knowledge improves, management measures (adaptive or otherwise) would be considered to reduce potential cumulative impacts in accordance with law, regulations, and the final RMPA.

Projects and activities identified as having the greatest likelihood to generate potential cumulative impacts when added to the RMPA alternatives are described below.

Population Growth

The cities and communities of Maricopa, Goodyear, Buckeye, and Gila Bend will continue to expand their boundaries through annexation. Other communities may also incorporate. The SDNM could be entirely surrounded by land annexed into cities or towns within ten years.

For residents and visitors in Maricopa County, western Pinal County, and northern Pima County, the SDNM and other BLM-administered lands will continue to serve as undeveloped open space as other lands are developed.

Tourism will continue to be a major industry in Arizona, especially for some rural areas. This will create a demand for tourism-related recreational opportunities and will increase the need for management.

In-migration from other US states, notably California, is expected to continue. Many new residents are not likely to be familiar with desert ecosystems or current and historical uses. Place-based values and culture are less likely to be shared by the majority of residents in rapidly changing communities.

Rights-of-Way (ROWs)

There are several ROWs within the SDNM. These include the El Paso Natural Gas Company pipeline, the Palo Verde to Pinal West 500kV Transmission Line and associated road along the SDNM's northern border, the SR 238 road corridor and adjacent telephone line and Union Pacific railroad, Interstate 8, and a transmission line on steel lattice towers south of the unincorporated community of Stanfield in the far-southeastern corner of the SDNM. There is a one-mile-wide utility corridor located on the east edge of the SDNM and additional corridors that run through the center of the Monument. These ROWs may be operated and maintained in keeping with the 2012 RMP. Because the SDNM is managed as an exclusion area for land use authorizations, no new ROWs would be granted on BLM-administered lands within its boundaries unless they provide access to private property inholdings where no other reasonable access exists, or they are for authorized emergency, public safety and administrative uses (BLM 2012).

Recreation and Travel Management

The SDNM Juan Bautista de Anza RMZ Recreation Plan Final EA is currently being prepared and is expected to be published in 2016. This EA analyzes

recreational use in the RMZ, including OHV travel and the design and development of parking, camping, sightseeing, and interpretive facilities. Motorized use in this area is currently prohibited but would be allowed on designated routes if the Proposed Action is approved.

Commercial and competitive recreation is limited in the SDNM and varies by season and year. Permitted activities include big game hunting, camping, OHV use, and driving for pleasure.

Nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, and Palo Verde Hills, would continue to provide desirable opportunities for visitors seeking a dispersed recreational target shooting experience.

Recreational target shooting opportunities in the SDNM may be limited under any of the alternatives if recreation disturbance thresholds established in the 2012 RMP are exceeded. These thresholds are based on the amount of surface disturbance surveyed in 2003-2005 associated with all recreational use (i.e., including target shooting and other activities; Foti and Chamber 2005). Exceedances may be triggered by disturbance associated with other recreational activities, but resultant closures of an area to recreation would also result in restrictions on recreational target shooting. These impacts would likely occur over the short term and could be negligible to moderate in intensity depending on the location. Because closures could be attributed to disturbance caused by any recreational activity, the potential for such closures is considered equal across all alternatives.

Wildfire Management

In very dry conditions, seasonal fire restrictions could be implemented to lessen the chance of human-caused wildfires. These restrictions also apply to discharge of firearms, resulting in a seasonal restriction on the SDMN and nearby recreational target shooting areas. When implemented, these restrictions would continue to result in a major short-term impact on dispersed recreational target shooting and could occur under any alternative depending on meteorological conditions.

Livestock Grazing

The SDNM has 10 associated grazing allotments, 4 of which are primarily located south of I-8, where livestock grazing was canceled by the proclamation. The remaining 6 allotments north of I-8 have lands both in and outside of the SDNM and are either classified as ephemeral or perennial/ephemeral. Ephemeral allotments are only authorized to graze seasonally when sufficient annual vegetation is present and are often stocked with young cattle. Perennial/ephemeral allotments are authorized for yearlong use and are often run as cow-calf operations. All allotments usually encompass a mixed ownership of private, Arizona State Trust, and BLM-administered lands.

Public Safety and Hazardous Materials

Damage to natural and recreation resources, and related public safety concerns, will increase as resource crime and vandalism incidents increase in the growing public land-urban interface. The cost to patrol, repair, restore, and monitor crime and vandalism to natural and recreation resources will increase over the next 20 years.

5.2 RESOURCES

5.2.1 Air Quality

The cumulative impacts analysis area for air quality includes Maricopa, Pima, and Pinal Counties. **Section 5.1.2** lists the past, present, and reasonably foreseeable cumulative actions within the cumulative impacts analysis area.

Cumulative impacts on air resources would generally be similar under all alternatives, as most impacts on air quality are short-term, localized impacts. Cumulative air quality impacts in the planning area have been addressed by air quality nonattainment plans and air quality maintenance plans that the MAG and the Arizona Department of Environmental Quality have been required to prepare for approval by the EPA. The Phoenix area is a nonattainment area for several air pollutants, and these plans address quantitative cumulative air quality impacts.

Air quality in the cumulative impacts analysis area has historically been affected by population growth, development, OHV use, and regional expansion from human development. These activities have increased emissions and created nonattainment areas within the planning area. In the present and reasonably foreseeable future, the cities and communities of Maricopa, Goodyear, Buckeye, and Gila Bend are expected to continue to expand, and communities may incorporate, surrounding the SDNM by land annexed into cities or towns.

With population growth, especially growth in the Phoenix nonattainment area, associated demand for recreational activities in the vicinity is also increasing and is expected to continue to increase. Increased recreational usage necessitates recreation-specific management and development, which have and will continue to result in increased emissions from OHV use within and outside of the planning area. With the continued use and development of BLM-neighboring lands, dust is likely to persist as a problem in the decision areas into the foreseeable future. The SDNM Juan Bautista de Anza RMZ Recreation Plan Final EA is currently being prepared. This EA analyzes recreational use in the RMZ, including OHV travel and the design and development of parking, camping, sightseeing, and interpretive facilities. If approved, the EA would allow OHV travel on designated routes in the RMZ.

ROWs and transportation network development has historically affected and will continue to affect air quality in the cumulative impacts analysis area by contributing to emissions and by creating fugitive dust. This has included past

road construction and contemporary development, such as US Interstate 8 and SR 238.

Land uses such as livestock grazing have affected and will continue to affect air quality through land disturbance from grazing animals and range improvements (BLM 1974) and wind erosion (USDA 2016). Livestock grazing also releases CH_4 (methane), which is approximately 28-36 times more potent than CO_2 in terms of global warming potential over a 100-year time frame (EPA 2016).

Air quality in the SDNM has been affected and will continue to be affected by off-site use, agricultural activities, and development. Off-site sources are the major contributors to dust within the planning area.

Wildfire is expected to increasingly affect air quality in the cumulative impacts analysis area. Expected wildfire increases are closely tied to increasing human use in the analysis area. Increasing human use will provide additional opportunities for wildfire ignitions, and smoke from prescribed burning and wildfires contain CO_2, as well as criteria pollutants, hazardous air pollutants (HAPs), CH_4, and N_2O (nitrous oxide). In addition to emissions from smoke, there would be PM_{10} and $PM_{2.5}$ emissions from vehicle exhaust and travel on unpaved roads associated with wildfire prevention and control.

Climate change is expected to increasingly impact air quality in the cumulative impacts analysis area. Arizona greenhouse gas (GHG) emissions have been rising rapidly compared with the nation as a whole as a result of the state's rapid rate of population and economic growth. From 1990 to 2000, Arizona's GHG emissions rose 51 percent compared with a national GHG emissions increase of 23 percent (Arizona Climate Change Advisory Group 2005).

Effects Common to All Alternatives

Under all alternatives, the BLM would implement mitigation and monitoring strategies, which would reduce the potential for and intensity of cumulative effects on air quality. For Alternatives A through D, measures to mitigate impacts of recreational target shooting on air quality would be implemented based on monitoring results. Under Alternative E, monitoring would ensure the proposed restriction of the SDNM to recreational target shooting would be enforced.

Under all alternatives, the BLM would continue to comply with national, state, and local laws and standards that would reduce the potential for cumulative effects on air quality. Cumulative air quality impacts in the planning area are addressed by air quality nonattainment plans and air quality maintenance plans. MAG and Arizona Department of Environmental Quality have been required to prepare these plans to address nonattainment issues for approval by the EPA as a result of Phoenix area nonattainment for several air pollutants.

Alternative A

Under Alternative A, all areas in the SDNM would remain available for recreational target shooting. Impacts on air quality from recreational target shooting would be concentrated along the El Paso Natural Gas Company pipeline road, the SR 238 corridor, and the Vekol Valley Road and would result in moderate localized impacts on air quality. In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative A would contribute to cumulative impacts on air quality to the greatest extent of any of the alternatives.

Alternative A would contribute to cumulative impacts on air quality due to vehicle usage and related emissions and surface disturbance caused by transportation to and from recreational target shooting areas. This would result in localized impacts on air quality from fugitive dust and emissions. Changes in air quality may also occur if recreational target shooting-caused fires were ignited in these areas.

Alternative B

Under Alternative B, temporary restrictions on recreational target shooting along the El Paso Natural Gas Company pipeline road would become permanent. Impacts on air quality from recreational target shooting would still be concentrated along the SR 238 corridor and the Vekol Valley Road.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative B would reduce cumulative impacts on air quality compared with Alternative A. Although a relatively small portion of the decision area would be restricted for recreational target shooting under Alternative B (10,100 acres), reductions in cumulative impacts on air quality may be disproportionately greater due to the concentrated nature of impacts in the restricted area. Alternative B would have slightly less cumulative impacts on air quality than Alternative A.

Alternative C

Under Alternative C, the Desert Back Country RMZ would be available for recreational target shooting. This would restrict approximately 52,800 acres compared with Alternative A, including portions of the El Paso Natural Gas Company pipeline road and the SR 238 corridor.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative C would reduce cumulative impacts on air quality compared with Alternative A, since it would restrict recreational target shooting in portions of areas where impacts are currently concentrated. Alternative C would have slightly less contributions to cumulative impacts on air quality, since surface disturbance would potentially be limited compared with Alternative A.

Alternative D

Under Alternative D, areas in the decision area available for recreational target shooting would be reduced by approximately 319,900 acres relative to Alternative A, due to restrictions within designated wilderness, lands managed to protect wilderness characteristics, and the Juan Bautista de Anza NHT RMZ. Restrictions would also include portions of the El Paso Natural Gas Company pipeline road and the SR 238 corridor.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative D would reduce cumulative impacts on air quality compared with Alternative A. This is because in addition to restricting recreational target shooting in areas where impacts on air quality are currently concentrated, Alternative D would also widely restrict recreational target shooting in most other areas of the SDNM (over 66 percent of the decision area would be managed as restricted).

Because restricted areas would reduce the amount of surface disturbance in the SDNM, the contribution to cumulative impacts on air quality under Alternative D would be reduced compared with Alternative A. However, because recreational target shooting is unlikely to occur in these areas due to their relative inaccessibility, reductions in cumulative impacts compared with Alternative A would be minor.

Alternative E

Under Alternative E, all areas in the SDNM would be restricted for recreational target shooting. Alternative E would not contribute to cumulative impacts on air quality from recreational target shooting.

5.2.2 Cultural and Heritage Resources

The cumulative impacts analysis area for cultural and heritage resources includes the entire SDNM and all lands within 10 miles of the SDNM boundary. This analysis area captures nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural Gas Company pipeline road along the SDMN's northern boundary. It also includes the Buckeye Hills area that is important to the traditional trail and song-scape associated with the Komatke Trail.

Cultural and heritage resources are a reflection of human uses that can also be impacted by subsequent human actions and natural processes. Much of the planning area, outside of transportation corridors, is relatively remote. Most cultural resources consist of archaeological sites that are not heavily visited or intensively impacted by development. In areas along transportation routes and active recreation areas, there have been past and present impacts on cultural resources resulting from roads and trail development, livestock grazing, recreation, mining, vandalism, illegal dumping, unauthorized collecting, and some isolated residential development.

The types of impacts on historic properties and other cultural resources that have occurred in the past are as follows:

- Loss of integrity due to physical or other disturbances
- Loss of setting
- Effects of natural processes, such as erosion and weathering
- Incremental disturbance from use or access
- Loss of access to historic properties and other cultural resources, as well as effects of vandalism and unauthorized collection

Section 5.1.2 lists the past, present, and reasonably foreseeable cumulative actions within the cumulative impacts analysis area. Current and future trends are population growth, transportation and ROW maintenance, construction associated with urban development, recreational demand, grazing, and access changes. These may impact historic properties, other cultural resources, and cultural landscapes through loss or disturbance of resources that are not protected, changes in setting, pressure from incremental use, loss of access, and vandalism.

Actions that could affect cultural resources on federal land or that are funded, licensed, or permitted by the federal government must comply with the NHPA and other laws, statutes, and regulations. Effects of undertakings on historic properties listed or considered eligible would need to be considered, and adverse effects would be avoided, minimized, or mitigated.

Anticipated population growth and construction associated with urban development on adjacent private lands would impact cultural resources through indirect damage or alterations to the setting. Likewise, current use and maintenance of ROW and transportation network development would also continue to affect cultural resources through direct surface disturbance, alterations to the setting, and increased access to cultural resources. Historic properties and the cultural landscapes of segments of the NHT outside of the SDNM and adjacent to areas of growth and development would be most susceptible to future impacts.

Growth in recreation demand associated with population increases would increase the likelihood of impacts on historic properties and other cultural resources through the loss of integrity from ground disturbance, access leading to increased threats of vandalism and unauthorized collection, increasing erosion, alterations to the setting, and interference with tribal uses and interests. The SDNM Juan Bautista de Anza RMZ Recreation Plan EA (in preparation) includes consideration of impacts on cultural resources and historic landscapes from facility development and OHV travel. Proactive planning, addressing anticipated increases in public recreational use should

reduce the potential for impacts on historic properties and other cultural resources.

Direct and indirect impacts on cultural resources from climate change may occur from increased wildfire, including increases in their size, frequency, and intensity; more severe and frequent flooding and erosion; and changes in habitat distribution and water availability. Wildfire could result in direct disturbance or loss of historic properties and other cultural resources by destroying or modifying historic structures, rock art, site features, artifacts, cultural use areas, and culturally modified trees. Flooding and erosion would likewise affect the physical integrity of structures and archaeological sites. Changes in habitat distribution and water availability could affect Native American traditional cultural uses.

Grazing and mining are activities that are minor contributors to current cumulative impacts on cultural resources on or adjacent to the SDNM.

Effects Common to All Alternatives

Implementing mitigation and monitoring strategies would also reduce contributions to cumulative impacts. These approaches would reduce the overall potential for impacts and could decrease the intensity of incremental impacts. However, monitoring may reveal impacts on historic properties that may have been prevented by restrictions or other proactive measures.

Under all alternatives, historic properties, unrecorded and unevaluated cultural resources, and objects of the SDNM with cultural value would continue to be affected by natural weathering and erosion processes. Ongoing and proposed human uses may also degrade the integrity of cultural uses.

Alternative A

Under Alternative A, all areas in the decision area would remain available for recreational target shooting. Although recreational target shooting has generally been concentrated in particular areas, this alternative would continue to make the most land available for this activity (486,400 acres). In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2,** Alternative A would correspond with the most potential for contributing to cumulative impacts on historic properties, unrecorded and unevaluated cultural resources, and objects of the SDNM.

Alternative A does not provide additional protections to historic properties and uninventoried or unevaluated cultural resources through restriction to any areas with known historic properties, including sensitive resources and Monument objects such as the Vekol Wash, the Juan Bautista de Anza NHT, the Mormon Battalion Trail, and the Butterfield Overland Stage Route. Noise and potential resource damage associated with recreational target shooting throughout the SDNM would be inconsistent with resolving threats and

conflicts from natural and human-caused degradation on the integrity of historic properties and uninventoried or unevaluated cultural resources in the SDNM.

Alternative B

Under Alternative B, areas in the decision area available for recreational target shooting would be reduced by 10,100 acres relative to Alternative A. Although there would be fewer acres available to this activity, the proposed restricted area has been previously disturbed by recreational target shooting. Alternative B does not provide additional protections for historic properties and uninventoried or unevaluated cultural resources through restrictions on identified sensitive resources and Monument objects (e.g., the Vekol Wash, the Juan Bautista de Anza NHT, the Mormon Battalion Trail, and the Butterfield Overland Stage Route).

The potential for impacts under Alternative B would be similar to Alternative A throughout most of the SDNM. However, restrictions on recreational target shooting in this area may displace this activity to other areas with road access, such as the nearby Juan Bautista de Anza NHT RMZ or to other areas where the risk of impacts on the integrity of historic properties and uninventoried or unevaluated cultural resources may increase. The Juan Bautista de Anza NHT RMZ is already heavily used. Trail resources and the associated site and landscape setting are considered Monument objects. Increased recreational target shooting, use, and access would increase the risk of impacts from surface disturbance, bullet strikes, vandalism, unauthorized collection, interference with tribal cultural uses, loss of interpretive opportunities, and the introduction of visual, atmospheric, or audible elements that could diminish the integrity of the setting and the feeling of the cultural landscape or to associated historic properties.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative B would likely result in similar potential for contributing to cumulative impacts on the integrity of historic properties and uninventoried or unevaluated cultural resources when compared with Alternative A. Although there would be fewer acres available for this activity, recreational target shooting may be displaced to other parts of the SDNM that are more sensitive to impacts on the integrity of historic properties, requiring the need to implement mitigation measures. Impacts from applying mitigation measures would be similar to those described for Alternative A, but they would likely affect a smaller area under Alternative B.

Alternative C

Under Alternative C, areas in the decision area available for recreational target shooting would be reduced by approximately 52,800 acres by restricting this activity within the Juan Bautista de Anza NHT RMZ. The RMZ contains cultural resources, historic properties and Monument objects such as the Juan Bautista de Anza NHT, the Mormon Battalion Trail, and the Butterfield Overland Stage

Route. This area has two petroglyph sites within its boundaries. The NHT also has additional management goals outlined in the NPS's CMP addressing protection for trail segments, archaeological sites, ethnographic resources, adjacent properties, research, and interpretation (NPS 1996). These restrictions would be consistent with protection criteria for Monument objects and CMP management goals for the Juan Bautista de Anza NHT.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative C would likely result in less potential for contributing to cumulative impacts on the integrity of historic properties and uninventoried or unevaluated cultural resources when compared with Alternative A. Alternative C would provide additional protections and reduce the risks of impacts on historic properties, cultural resources, trail resources, and associated settings. Restricting recreational target shooting in the Juan Bautista de Anza NHT RMZ could displace this activity to other areas of the SDNM, such as the Desert Back Country RMZ or the El Paso Natural Gas Company pipeline road, or to locations off of the SDNM. The potential for impacts on historic properties and unrecorded and unevaluated cultural resources in the SDNM would be reduced overall, but potential impacts in available areas would be similar to those under Alternative A.

Alternative D

Under Alternative D, recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ, three designated wilderness units, and lands managed to protect wilderness characteristics, totaling approximately 319,900 acres. This includes approximately 52,800 acres in the Juan Bautista de Anza NHT RMZ, approximately 159,100 acres of designated wilderness, and approximately 108,100 acres of lands managed to protect wilderness characteristics within the decision area. These areas are not currently popular for recreational target shooting because of the lack of motorized vehicle access, and as a result, these areas may have a higher percentage of undisturbed cultural resources and intact settings.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2** Alternative D would likely result in less potential for contributing to cumulative impacts on the integrity of historic properties and uninventoried or unevaluated cultural resources when compared with Alternative A. Alternative D would provide additional protections and reduce the risks of impacts on historic properties, cultural resources, trail resources, and associated settings. Among the additional restricted areas to recreational target shooting, culturally sensitive areas and Monument objects south of I-8 in the Table Top Wilderness and other locations throughout the SDNM would be included. Restrictions on recreational target shooting would be concentrated in the areas described above; potential impacts in the approximately 166,350 acres available to recreational target shooting in the decision area would be similar to those under Alternative A.

Because 66 percent of the decision area would be restricted for recreational target shooting, there would likely be less overall recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Impacts from applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative D. In the area outside of SDNM boundaries, but within the 10-mile analysis area, shooting would be expected to increase, especially in the areas around Seven Mile Mountain, Palo Verde Hills, and the Sierra Estrella.

Alternative E

Under Alternative E, recreational target shooting would not be available in the SDNM. This would eliminate potential cumulative impacts on cultural resources from this as an authorized activity. Recreational target shooting would likely continue in areas outside of the SDNM. Under Alternative E, monitoring would ensure that the proposed restriction of recreational target shooting in the SDNM would be enforced. Since the entire SDNM would be restricted to recreational target shooting, the BLM would not likely need to implement mitigation measures. However, the recreational target shooting activities would increasingly be pushed into other areas nearby.

5.2.3 Priority Wildlife Species and Habitat

The cumulative impacts analysis area for priority wildlife species and habitat is the SDNM and all lands within 10 miles of the SDNM boundary. This analysis area captures nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural Gas Company pipeline road along the SDMN's northern boundary.

Effects Common to All Alternatives

Under all alternatives, changing climatic conditions are expected to affect priority wildlife species and habitats in the SDNM. The Sonoran Desert is projected to experience a general warming trend, with notable increases in winter temperatures (Hostetler et al. 2011) and increases in the number of frost-free winter days (Abatzoglou and Kolden 2011). There is more uncertainty in precipitation predictions; however, there is general agreement that precipitation will decrease over much of the subtropics (Strittholt et al. 2012). Reduced precipitation could result in reduced forage for wildlife, and periods of drought may limit recruitment in species such as mule deer, desert bighorn sheep, and 10J experimental Sonoran pronghorn antelope populations (although no experimental populations are established yet; AGFD 2002; WAFWA 2004; Epps et al. 2004).

Increased demand for recreational opportunities in the SDNM could result in increased wildlife habitat avoidance or other changes in wildlife behavior.

Land uses also have affected and will continue to affect wildlife habitat by facilitating the establishment and spread of nonnative, invasive plant species. In

those areas where livestock grazing occurs, livestock can transport invasive plant seeds on their coats or through their digestive systems (DiTomaso 2000). Recreational users can introduce and spread invasive plant seeds via vehicles, tires, shoes, clothing, pack animals and horses, stock feed, and other recreational equipment. Roads and utility corridors promote invasive plant dispersal by fragmenting habitats, altering hydrology, opening ecological niches, and providing movement corridors (Trombulak and Frissell 2000; Parendes and Jones 2000; Gelbard and Belnap 2003). In the SDNM, nonnative, invasive species are often associated with disturbed areas like roadsides and popular recreational areas.

Wildfire is expected to increasingly affect wildlife habitat in the cumulative impacts analysis area. An increase in wildfire is expected due to a continual increase in human use as well as continual proliferation of invasive annual plants in the analysis area. An increase in human use will provide additional opportunities for wildfire ignitions and the invasive annual grasses growing in the inter-shrub spaces will allow wildfire to spread more readily. Native Sonoran Desert vegetation is not fire-adapted and is generally readily killed by wildfire. In Arizona, wildfires fueled by nonnative, invasive annual grasses have increased dramatically in recent years leading to relatively barren landscapes dominated by these species (Van Devender et al. 1997).

Under all alternatives, the BLM would implement mitigation and monitoring strategies, which would reduce the potential for and intensity of cumulative effects on priority wildlife species and habitat.

Alternative A

All Priority Wildlife Species and Habitats

Under Alternative A, 486,400 acres of the decision area would remain available for recreational target shooting. Impacts on wildlife species and habitat from recreational target shooting would be concentrated along the El Paso Natural Gas Company pipeline road, the SR 238 corridor, and the Vekol Valley Road. In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative A would contribute to cumulative impacts on wildlife species and habitat to the greatest extent of any of the alternatives. Recreational target shooting, in combination with climatic changes (particularly extended periods of drought), may reduce recruitment for species such as mule deer and desert bighorn sheep, with the magnitude of impacts dependent on the duration and intensity of drought periods.

Water catchments are of particular importance to wildlife during periods of drought. Because all wildlife water catchments would be in areas available to recreational target shooting under Alternative A, avoidance of these areas could effectively result in reduced function of an important habitat component for many of the mammals that occupy the SDNM.

Alternative A would contribute to cumulative impacts on wildlife habitat due to mechanical damage to vegetation caused by bullets in recreational target shooting areas. This would result in localized reductions in the extent and condition of native vegetation communities and vegetation objects, including saguaro cacti. Spread of invasive grasses can degrade wildlife habitats, as well as encourage fires, which could remove vegetation cover. Further, the expected increase in human use will provide additional opportunities for wildfire ignitions. Recreational target shooting-caused wildfires could result in loss of plant communities and wildlife habitat components necessary for thermal protection and ecosystem function (Bagne et al. 2012). ROWs construction of new or improved roads would promote increased human visitation into areas not previously accessible, increasing the potential for disturbance to priority wildlife populations and habitats. ROWs and roads may also fragment habitat. Road use may further increase the potential for wildlife-vehicle collisions. The Sonoran desert tortoise is particularly susceptible to vehicle collisions (Arizona Interagency Desert Tortoise Team 1996).

The continued demand for other recreation opportunities in the SDNM, along with recreational target shooting, may result in wildlife habitat avoidance or behavioral disturbance over the long term.

Sonoran Desert Tortoise

Impacts from past, present, and reasonably foreseeable future actions described above in conjunction with Alternative A to Sonoran desert tortoise would result in cumulative habitat degradation and fragmentation, injury or mortality to individuals, and habitat avoidance, as described in **Chapter 4**. Mitigation measures under Alternative A could result in a reduced potential for desert tortoise mortality and disturbance and could help to retain important habitat components for the species. Based on this, incremental impacts on desert tortoise as a result of Alternative A, when added to the past, present, and reasonably foreseeable future actions, are expected to be minor.

Desert Bighorn Sheep

Impacts from past, present, and reasonably foreseeable future actions described above in conjunction with Alternative A to desert bighorn sheep would result in cumulative habitat degradation and fragmentation, injury or mortality to individuals, habitat avoidance, and changes in movement patterns and habitat use, as described in **Chapter 4**. Mitigation measures under Alternative A could result in a reduced potential for desert bighorn sheep mortality and disturbance and could help to retain important habitat components for the species. Based on this, incremental impacts on desert bighorn sheep as a result of Alternative A, when added to the past, present, and reasonably foreseeable future actions, are expected to be minor.

Mule Deer

Impacts from past, present, and reasonably foreseeable future actions described above in conjunction with Alternative A to mule deer would result in cumulative habitat degradation and fragmentation, injury or mortality to individuals, and avoidance of forage sites or cover areas, as described in **Chapter 4**. Mitigation measures under Alternative A could result in a reduced potential for mule deer mortality and disturbance and could help to retain important habitat components for the species. Based on this, incremental impacts on mule deer as a result of Alternative A, when added to the past, present, and reasonably foreseeable future actions, are expected to be minor.

Sonoran Pronghorn Antelope

Impacts from past, present, and reasonably foreseeable future actions described above in conjunction with Alternative A to Sonoran pronghorn antelope would result in cumulative habitat degradation and fragmentation, injury or mortality to reintroduced individuals, and habitat avoidance, as described in **Chapter 4**. Existing range improvements, specifically fences, may fragment Sonoran pronghorn antelope 10J experimental population habitat and may further impede access to water when combined with habitat avoidance from active recreational target shooting in the vicinity of water catchments. Additionally, Sonoran pronghorn may become entangled in fences, resulting in injury or mortality.

Mitigation measures under Alternative A could result in a reduced potential for Sonoran pronghorn mortality and disturbance and could help to retain important habitat components for the species. Based on this, incremental impacts on Sonoran pronghorn as a result of Alternative A, when added to the past, present, and reasonably foreseeable future actions, are expected to be minor.

Raptors

Impacts from past, present, and reasonably foreseeable future actions described above in conjunction with Alternative A to raptors would result in cumulative degradation of foraging or nesting habitat and habitat avoidance, as described in **Chapter 4**. Mitigation measures under Alternative A could result in a reduced potential for raptor disturbance and could help to retain important habitat components for some species, such as for the cactus ferruginous pygmy-owl. Based on this, incremental impacts on raptors as a result of Alternative A, when added to the past, present, and reasonably foreseeable future actions, are expected to be minor.

Alternative B

All Priority Wildlife Species and Habitats

The contribution to cumulative impacts under Alternative B would be similar to those described under Alternative A. There would be a 2 percent reduction

(10,100 acres) in areas available to recreational target shooting, which may reduce the potential for cumulative impacts in localized areas (specifically along the El Paso Natural Gas Company pipeline road). However, these restrictions would not preclude cumulative impacts, and climate change, spread of invasive plants, wildfire, livestock grazing, ROWs and new road construction, and continued recreation use would be expected to cumulatively impact priority wildlife and habitats as described under Alternative A.

Sonoran Desert Tortoise

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the similar acreage that would be available for recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative B on Sonoran desert tortoise is expected to be similar. Impacts may be reduced along the El Paso Natural Gas Company pipeline road.

Desert Bighorn Sheep

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the similar acreage that would be available for recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative B on desert bighorn sheep is expected to be similar. Impacts may be reduced along the El Paso Natural Gas Company pipeline road.

Mule Deer

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the similar acreage that would be available for recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative B on mule deer is expected to be similar. Impacts may be reduced along the El Paso Natural Gas Company pipeline road.

Sonoran Pronghorn Antelope

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the similar acreage that would be available for recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative B on Sonoran pronghorn antelope is expected to be similar. Impacts may be reduced along the El Paso Natural Gas Company pipeline road.

Raptors

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the similar acreage that would be available for recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative B on raptors is expected to be similar. Impacts may be reduced along the El Paso Natural Gas Company pipeline road.

Alternative C

All Priority Wildlife Species and Habitats

The contribution to cumulative impacts under Alternative C would be similar to, but less than, those described under Alternative A, as there would be an 11 percent reduction (52,800 acres) in areas available to recreational target shooting. Restrictions on recreational target shooting in the Juan Bautista de Anza NHT RMZ would reduce the potential for cumulative impacts in this area. However, these restrictions would not preclude cumulative impacts. Climate change, spread of invasive plants, wildfire, livestock grazing, ROWs and new road construction, and continued recreation use would cumulatively impact priority wildlife and habitats as described under Alternative A, although the magnitude of impacts would likely be less.

Sonoran Desert Tortoise

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the similar acreage that would be available for recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative C on Sonoran desert tortoise is expected to be similar. Impacts may be reduced in the Juan Bautista de Anza NHT RMZ.

Desert Bighorn Sheep

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the similar acreage that would be available for recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative C on desert bighorn sheep is expected to be similar. Impacts may be reduced in the Juan Bautista de Anza NHT RMZ.

Mule Deer

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the similar acreage that would be available for recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative C on mule deer is expected to be similar. Impacts may be reduced in the Juan Bautista de Anza NHT RMZ.

Sonoran Pronghorn Antelope

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the similar acreage that would be available for recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative C on Sonoran pronghorn antelope is expected to be similar. Impacts may be reduced in the Juan Bautista de Anza NHT RMZ.

Raptors

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the similar acreage that would be available for recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative C on raptors is expected to be similar. Impacts may be reduced in the Juan Bautista de Anza NHT RMZ.

Alternative D

All Priority Wildlife Species and Habitats

The impacts under Alternative D would be similar to, but less than, those described under Alternative A, as there would be a 66 percent reduction (319,900 acres) in areas available to recreational target shooting. Restrictions on recreational target shooting in the Juan Bautista de Anza NHT RMZ, three designated Wilderness units, and lands managed to protect wilderness characteristics would reduce the potential for cumulative impacts. There would be more wildlife catchments (10 total) where recreational target shooting would be restricted, which would reduce the potential for cumulative impacts associated with reduced use of an important habitat component, particularly during times of drought. However, these restrictions would not preclude cumulative impacts. Climate change, spread of invasive plants, wildfire, livestock grazing, ROWs and new road construction, and continued recreation use would cumulatively impact priority wildlife and habitats as described under Alternative A, although the magnitude of impacts would likely be less.

Sonoran Desert Tortoise

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the magnitude of reduction in acres available to recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative D on Sonoran desert tortoise is expected to be reduced.

Desert Bighorn Sheep

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the magnitude of reduction in acres available to recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative D on desert bighorn sheep is expected to be reduced.

Mule Deer

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the magnitude of reduction in acres available to recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative D on mule deer is expected to be reduced.

Raptors

Impacts from past, present, and reasonably foreseeable future actions are expected to be the same as described for Alternative A. Given the magnitude of reduction in acres available to recreational target shooting compared with Alternative A, the contribution to cumulative impacts from Alternative D on raptors is expected to be reduced.

Alternative E

All Priority Wildlife Species and Habitats

Under Alternative E, all areas in the SDNM would be restricted for recreational target shooting. Alternative E would not contribute to cumulative impacts on priority wildlife species and habitat from recreational target shooting. Therefore, cumulative impacts under Alternative E would be expected to be consistent with those described under the result of other past, present, and reasonably foreseeable future actions as described under *Effects Common to All Alternatives*.

Table 5-2 summarizes the cumulative impacts on priority wildlife species and habitat under each alternative.

Table 5-2
Summary of Cumulative Impacts on Priority Wildlife Species and Habitat

	Acres Available to Recreational Target Shooting	Percent of Decision Area Available to Recreational Target Shooting	Intensity of Cumulative Impacts by Alternative
Alternative A	486,400	100	Moderate
Alternative B	476,300	98	Moderate
Alternative C	433,600	89	Moderate
Alternative D	166,500	34	Moderate/Minor
Alternative E	0	0	Negligible

5.2.4 Soil Resources

The cumulative impacts analysis area for soil resources is the SDNM and all lands within 10 miles of the SDNM boundary. This analysis area captures nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural Gas Company pipeline road along the SDMN's northern boundary. **Section 5.1.2** lists the past, present, and reasonably foreseeable future actions within the planning area. Of these, ROWs, recreation and travel management, and livestock grazing have impacts on soil resources in the planning area.

ROWs impact soils over the short and long terms through temporary and permanent disturbances of soils and vegetation. The amount of temporary and permanent disturbance depends on both the size of the ROW and the use for which the ROW is being developed. For example, roads have a greater permanent disturbance area than linear utilities of similar length. Past, present,

and reasonably foreseeable ROW actions have and will continue to impact soil resources throughout the planning area.

Recreation, travel management, and livestock grazing impact soil health and sensitive soils by changing the characteristics and composition of soil resources, though there is there is the potential for reclamation from these forms of disturbances. These forms of past, present, and reasonably foreseeable future impacts on soil resources involves all areas where recreation, recreational travel, and grazing occur in the planning area.

Effects Common to All Alternatives

Under all alternatives, the BLM would implement mitigation and monitoring strategies, which would reduce the potential for and intensity of cumulative effects on soil resources. For Alternatives A through D, measures to mitigate impacts of recreational target shooting on soil resources would be implemented based on monitoring results. Under Alternative E, monitoring would ensure the proposed restriction of the SDNM to recreational target shooting would be enforced.

Alternative A

Alternative A would continue to have no restrictions with respect to recreational target shooting in the decision area (486,400 acres). Consequently, all soil resources would continue to be in areas where recreational target shooting can occur. In combination with the past, present, and reasonably foreseeable future actions, Alternative A would continue to contribute to cumulative impacts on soil health and sensitive soils due to surface disturbances associated with recreational target shooting activities and contamination associated with use of ammunition and materials that remain in the environment. Because recreational target shooting is already occurring within the entire SDNM, Alternative A would not change the cumulative impacts on soil health and sensitive soils, and current minor cumulative impacts would continue for the planning area. Impacts on soil health and sensitive soils from recreational target shooting would likely be concentrated along the El Paso Natural Gas Company pipeline road, the SR 238 corridor, and the Vekol Valley Road.

Alternative B

Under Alternative B, the area that is temporarily restricted under the 2015 court order (approximately 10,100 acres) would become permanently restricted to recreational target shooting. Recreational target shooting would likely be concentrated along the SR 238 corridor and Vekol Valley Road.

In combination with the past, present, and reasonably foreseeable future actions, Alternative B would not contribute to cumulative impacts on soil health and sensitive soils due to surface disturbances associated with recreational target shooting activities and contamination associated with use of ammunition and materials that remain in the environment. Because recreational target shooting

would cease on 10,100 acres, Alternative B would decrease the cumulative impacts on soil health and sensitive soils by a moderate amount in this area. Cumulative impacts could increase by a minor to moderate amount in areas where displaced recreational target shooters relocate, depending on their use patterns and the soil sensitivity in these areas.

Alternative C

Under Alternative C, recreational target shooting would be available in the Desert Back Country RMZ (approximately 433,600 acres). Recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ (approximately 52,800 acres), which contains the Butterfield Pass Trail, the Mormon Battalion Trail, and the Juan Bautista de Anza NHT. Restrictions would also include portions of the El Paso Natural Gas Company pipeline road and SR 238 corridor.

In combination with the past, present, and reasonably foreseeable future actions, Alternative C would not contribute to cumulative impacts on soil health and sensitive soils due to surface disturbances associated with recreational target shooting activities and contamination associated with use of ammunition and materials that remain in the environment. Because recreational target shooting would cease on 52,800 acres, Alternative C would decrease the cumulative impacts on soil health and sensitive soils by a minor to moderate amount for this portion of the planning area. Cumulative impacts could increase by a minor to moderate amount in areas where displaced recreational target shooters relocate, depending on their use patterns and the soil sensitivity in these areas.

Alternative D

Under Alternative D, the Juan Bautista de Anza NHT RMZ, three designated Wilderness units, and lands managed to protect wilderness characteristics would be restricted to recreational target shooting (approximately 319,900 acres). Approximately 159,100 acres of designated wilderness and 108,100 acres of lands managed to protect wilderness characteristics in the decision area would be restricted to this activity, providing protection for wilderness attributes. In addition, recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ (approximately 52,800 acres), which contains the Butterfield Pass Trail, the Mormon Battalion Trail, and the Juan Bautista de Anza NHT. Restrictions would also include portions of the El Paso Natural Gas Company pipeline road and SR 238 corridor.

In combination with the past, present, and reasonably foreseeable future actions, Alternative D would not contribute to cumulative impacts on soil health and sensitive soils due to surface disturbances associated with recreational target shooting activities and contamination associated with use of ammunition and materials that remain in the environment. Because recreational target shooting would cease on 319,900 acres, Alternative D would decrease the cumulative impacts on soil health and sensitive soils for these portions of the planning area

by a negligible to moderate amount. Cumulative impacts could increase by a minor to moderate amount in areas where displaced recreational target shooters relocate, depending on their use patterns and the soil sensitivity in these areas.

Alternative E

Under Alternative E, all areas in the SDNM would be restricted for recreational target shooting. Alternative E would not contribute to cumulative impacts on soil health and sensitive soils from recreational target shooting in the planning area. Cumulative impacts could increase by a minor to moderate amount in areas outside the SDNM where displaced recreational target shooters relocate, depending on their use patterns and the soil sensitivity in these areas.

5.2.5 Vegetation

The cumulative impacts analysis area for vegetation resources includes the SDNM and the watershed boundaries that overlap and extend beyond the SDNM boundary. **Section 5.1.2** lists the past, present, and reasonably foreseeable cumulative actions within the cumulative impacts analysis area.

Vegetation resources, including vegetation communities, special status plants, and vegetation objects, in the cumulative impacts analysis area have historically been affected by community settlement, development, and expansion. These activities have removed and fragmented vegetation communities and special status plants that were in the development footprint. In the present and reasonably foreseeable future, the cities and communities of Maricopa, Goodyear, Buckeye, and Gila Bend are expected to continue to expand and communities may incorporate, surrounding the SDNM by land annexed into cities or towns.

With population growth, associated demand for undeveloped open space and recreational activities in the vicinity is also increasing and is expected to continue to increase. Increased recreational usage necessitates recreation-specific management and development, which can remove or fragment vegetation communities and lead to reduced habitat and habitat quality for special status plants. The SDNM Juan Bautista de Anza RMZ Recreation Plan Final EA is currently being prepared. This EA analyzes recreational use in the RMZ, including OHV travel and the design and development of parking, camping, sightseeing, and interpretive facilities.

ROWs and transportation network development has historically affected and will continue to affect vegetation in the cumulative impacts analysis area by removing and fragmenting vegetation communities and special status plants. This has included past road construction, which connected developing communities, and contemporary development, such as US Interstate 8 and SR 238. Linear ROWs, such as the El Paso Gas Pipeline, have similar effects on vegetation as roads, including reducing the extent of, and fragmenting, vegetation communities.

Land uses described above also have affected and will continue to affect vegetation resources by facilitating the establishment and spread of nonnative, invasive plant species. In those areas where livestock grazing occurs, livestock can transport invasive plant seeds on their coats or through their digestive systems (DiTomaso 2000). Recreational users can introduce and spread invasive plant seeds via vehicles, tires, shoes, clothing, pack animals and horses, stock feed, and other recreational equipment. Roads and utility corridors promote invasive plant dispersal by fragmenting habitats, altering hydrology, opening ecological niches, and providing movement corridors (Trombulak and Frissell 2000; Parendes and Jones 2000; Gelbard and Belnap 2003). In the SDNM, nonnative, invasive species are often associated with disturbed areas like roadsides and popular recreational areas.

Wildfire is expected to increasingly affect vegetation resources in the cumulative impacts analysis area. An increase in wildfire is expected due to a continual increase in human use as well as continual proliferation of invasive annual plants in the analysis area. An increase in human use will provide additional opportunities for wildfire ignitions and the invasive annual grasses growing in the inter-shrub spaces will allow wildfire to spread more readily. Native Sonoran Desert vegetation is not fire-adapted and is generally readily killed by wildfire. In Arizona, wildfires fueled by nonnative, invasive annual grasses have increased dramatically in recent years leading to relatively barren landscapes dominated by these species (Van Devender et al. 1997).

Finally, changing climatic conditions are expected to increasingly affect vegetation resources in the cumulative impacts analysis area. The Sonoran Desert is projected to experience a general warming trend, with notable increases in winter temperatures (Hostetler et al. 2011) and increases in the number of frost-free winter days (Abatzoglou and Kolden 2011). There is more uncertainty in precipitation predictions; however, there is general agreement that precipitation will decrease over much of the subtropics (Strittholt et al. 2012). Potential ecological responses to increased warming and declines in the summer monsoon may be increased wildfire, invasive annual species expansion, and woody plant loss (Strittholt et al. 2012). Characteristic plant species distribution within Sonoran Desert ecosystems may also change, including a possible decrease in saguaro cacti (Weis and Overpeck 2005; Ryan and Archer 2008).

Effects Common to All Alternatives

Under all alternatives, the BLM would implement mitigation and monitoring strategies, which would reduce the potential for and intensity of cumulative effects on vegetation resources. For Alternatives A through D, measures to mitigate impacts of recreational target shooting on vegetation resources would be implemented based on monitoring results. Under Alternative E, monitoring would ensure the proposed restriction of the SDNM to recreational target shooting would be enforced.

Under all alternatives, the BLM would continue to implement national, state, and local fire restrictions and bans on explosive targets that would reduce the potential for cumulative effects on vegetation resources arising from recreational target shooting-caused fires.

Alternative A

Under Alternative A, all areas in the SDNM would remain available for recreational target shooting. Impacts on vegetation resources from recreational target shooting would be concentrated along the El Paso Natural Gas Company pipeline road, the SR 238 corridor, and the Vekol Valley Road. In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative A would contribute to cumulative impacts on vegetation resources to the greatest extent of any of the alternatives.

Alternative A would contribute to cumulative impacts on vegetation communities and vegetation objects due to mechanical damage to vegetation caused by bullets in recreational target shooting areas. This would result in localized reductions in the extent and condition of native vegetation communities and vegetation objects, including saguaro cacti. Changes in ecological conditions supporting vegetation resources may also occur if recreational target shooting-caused fires were ignited in areas invaded by nonnative, invasive plants, converting native vegetation communities to communities dominated by nonnative invasive plants.

The potential for Alternative A to contribute to cumulative impacts on special status plants would be minor, as most special status plants are located in relatively inaccessible locations where recreational target shooting is unlikely to occur. An exception is for Tumamoc globeberry, which occurs at lower elevations in the Vekol Valley area of the SDNM. Since this species occurs in a more accessible location, the potential for individual or suitable habitat loss via changes in ecological conditions is higher than for other special status plants.

Alternative B

Under Alternative B, temporary restrictions on recreational target shooting along the El Paso Natural Gas Company pipeline road would become permanent. Impacts on vegetation resources from recreational target shooting would still be concentrated along the SR 238 corridor and the Vekol Valley Road.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative B would reduce cumulative impacts on vegetation communities and vegetation objects compared with Alternative A. Although a relatively small portion of the decision area would be restricted for recreational target shooting under Alternative B (10,100 acres), reductions in cumulative impacts on vegetation may be disproportionately greater due to the concentrated nature of impacts in the restricted area. Alternative B would have

the same contributions to cumulative impacts on special status plants as Alternative A.

Alternative C

Under Alternative C, the Desert Back Country RMZ would be available for recreational target shooting. This would restrict approximately 52,800 acres compared with Alternative A, including portions of the El Paso Natural Gas Company pipeline road and the SR 238 corridor.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative C would reduce cumulative impacts on vegetation communities and vegetation objects compared with Alternative A, since it would restrict recreational target shooting in portions of areas where impacts are currently concentrated. Alternative C would have approximately the same contributions to cumulative impacts on special status plants as Alternative A.

Alternative D

Under Alternative D, areas in the decision area available for recreational target shooting would be reduced by approximately 319,900 acres relative to Alternative A, due to restrictions within designated wilderness, areas managed to protect wilderness characteristics, and the Juan Bautista de Anza NHT RMZ. Restrictions would also include portions of the El Paso Natural Gas Company pipeline road and the SR 238 corridor.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative D would reduce cumulative impacts on vegetation communities and vegetation objects compared with Alternative A. This is because in addition to restricting recreational target shooting in areas where impacts on vegetation are currently concentrated, Alternative D would also widely restrict recreational target shooting in most other areas of the SDNM (over 66 percent of the decision area would be managed as restricted).

Because restricted areas would include habitat for most special status plant species in the Sand Tank and other mountains, the contribution to cumulative impacts on special status plants under Alternative D would be reduced compared with Alternative A. However, because recreational target shooting is unlikely to occur in these areas due to their relative inaccessibility, reductions in cumulative impacts compared with Alternative A would be minor.

Alternative E

Under Alternative E, all areas in the SDNM would be restricted for recreational target shooting. Alternative E would not contribute to cumulative impacts on vegetation resources from recreational target shooting. Therefore, cumulative impacts under Alternative E would be the result of other past, present, and reasonably foreseeable future actions as described under *Effects Common to All Alternatives*.

5.2.6 Water Resources

The cumulative impacts analysis area for water resources extends outside the planning area, following watershed boundaries that completely or partially overlap the planning area. **Section 5.1.2** lists the past, present, and reasonably foreseeable future actions in the planning area. Of these, population growth, ROWs, recreation and travel management, and livestock grazing have impacted and would continue to impact water resources.

Population growth and associated growth of cities and communities converts undeveloped areas for rural and urban uses. Ephemeral streams and their drainages are affected by the expansion of cities and communities, because the water resources are disturbed by development and activities that permanently change the hydrologic cycle. These forms of past, present, and reasonably foreseeable future impacts on water resources include the communities of Maricopa, Goodyear, Buckeye, and Gila Bend.

ROWs have similar impacts on ephemeral streams as the growth of cities and communities, depending on the size and the type of ROW. These forms of past, present, and reasonably foreseeable future impacts on water resources include all ROWs in the planning area.

Recreation, travel management, and livestock grazing impact water resources by changing ephemeral streams and their drainages, but typically to a lesser extent than the growth of cities and communities. These forms of past, present, and reasonably foreseeable future impacts on water resources involves all areas where recreation and recreation travel occur in the planning area and where grazing allotments occur in the planning area.

Effects Common to All Alternatives

Under all alternatives, BLM would implement mitigation and monitoring strategies, which would reduce the potential for and intensity of cumulative effects on water resources. For Alternatives A through D, measures to mitigate impacts of recreational target shooting on water resources would be implemented based on monitoring results. Under Alternative E, monitoring would ensure the proposed restriction of the SDNM to recreational target shooting would be enforced.

Alternative A

Alternative A would continue to have no restrictions with respect to recreational target shooting in the entire decision area (486,400 acres). Consequently, all water resources would continue to be in areas where recreational target shooting can occur. In combination with the past, present, and reasonably foreseeable future actions, Alternative A would continue to contribute to cumulative impacts on ephemeral streams due to erosion and sedimentation associated with recreational target shooting activities and contamination associated with use of ammunition and materials that remain in the environment. Because recreational target shooting is already occurring

within the entire SDNM, Alternative A would not change the cumulative impacts on ephemeral streams, and current minor cumulative impacts would continue for the planning area. Impacts on ephemeral streams from recreational target shooting would likely be concentrated along the El Paso Natural Gas Company pipeline road, the SR 238 corridor, and Vekol Valley Road.

Alternative B

Under Alternative B, the area that is temporarily restricted under the 2015 court order (approximately 10,100 acres) would become permanently restricted to recreational target shooting. Recreational target shooting would likely be concentrated along the SR 238 corridor and Vekol Valley Road.

In combination with the past, present, and reasonably foreseeable future actions, Alternative B would not contribute to cumulative impacts on ephemeral streams due to erosion and sedimentation associated with recreational target shooting activities and contamination associated with use of ammunition and materials that remain in the environment. Because recreational target shooting would cease on 10,100 acres, Alternative B would decrease the cumulative impacts by a minor to moderate amount on the ephemeral streams in this portion of the planning area. Cumulative impacts could increase by a minor to moderate amount in areas where displaced recreational target shooters relocate, depending on their use patterns and the water resources in these areas.

Alternative C

Under Alternative C, recreational target shooting would be available in the Desert Back Country RMZ (approximately 433,600 acres). Recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ (approximately 52,800 acres), which contains the Butterfield Pass Trail, the Mormon Battalion Trail, and the Juan Bautista de Anza NHT. Restrictions would also include portions of the El Paso Natural Gas Company pipeline road and SR 238 corridor.

In combination with the past, present, and reasonably foreseeable future actions, Alternative C would contribute to cumulative impacts on ephemeral streams in the portion of the cumulative impacts analysis area available for recreational target shooting. This would be due to erosion and sedimentation associated with recreational target shooting activities and contamination associated with use of ammunition and materials that remain in the environment. In areas where displaced recreational target shooters relocate, cumulative impacts could increase by a minor to moderate amount, depending on use patterns and the water resources in these areas. Because recreational target shooting would cease on 52,800 acres, Alternative C would decrease the cumulative impacts on ephemeral streams in this portion the cumulative impact analysis area.

Alternative D

Under Alternative D, the Juan Bautista de Anza NHT RMZ, three designated Wilderness units, and lands managed to protect wilderness characteristics

would be restricted to recreational target shooting (approximately 319,900 acres). Approximately 159,100 acres of designated wilderness, along with approximately 108,100 acres of lands managed to protect wilderness characteristics within the decision area would be restricted to this activity, providing protection for wilderness attributes. In addition, recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ (approximately 52,800 acres) which contains the Butterfield Pass Trail, the Mormon Battalion Trail, and the Juan Bautista de Anza NHT. Restrictions would also include portions of the El Paso Natural Gas Company pipeline road and SR 238 corridor.

In combination with the past, present, and reasonably foreseeable future actions, Alternative D would contribute to cumulative impacts on ephemeral streams in the portion of the cumulative impacts analysis area available for recreational target shooting. This would be due to erosion and sedimentation associated with recreational target shooting activities and contamination associated with use of ammunition and materials that remain in the environment. In areas where displaced recreational target shooters relocate, Cumulative impacts could increase by a minor to moderate amount, depending on use patterns and the water resources in these areas. Because recreational target shooting would cease on 319,900 acres, Alternative D would decrease the cumulative impacts on ephemeral streams in the cumulative impact analysis area by a negligible to moderate amount.

Alternative E

Under Alternative E, all areas in the SDNM would be restricted for recreational target shooting. Alternative E would not contribute to cumulative impacts on ephemeral streams from recreational target shooting in the planning area. Cumulative impacts on ephemeral streams outside the SDNM could increase by a minor to moderate amount in areas where displaced recreational target shooters relocate, depending on their use patterns and the water resources in these areas.

5.2.7 Lands with Wilderness Characteristics

The cumulative impacts analysis area for lands with wilderness characteristics is the SDNM and all lands within 10 miles of the SDNM boundary. This analysis area captures nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural Gas Company pipeline road along the SDMN's northern boundary.

Effects Common to All Alternatives

Overall, the decision area has maintained a high degree of naturalness since the original 1978-1980 wilderness characteristics review. There have been no large-scale or incompatible land uses with long-lasting or irreversible impacts on naturalness in the SDNM occurring since 1980.

As the population of cities and communities near the SDNM grow, the demand for tourism-related opportunities will also grow. More people seeking recreational activities will impact the ability for visitors to find solitude throughout the SDNM.

Motorized access is allowed on designated routes within lands managed to protect wilderness characteristics. This activity reduces the likelihood that these areas would meet the criteria for lands with wilderness characteristics in future wilderness characteristics inventories. This is because the increase in human and vehicle presence and noise associated with motorized use would degrade naturalness and outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Despite the potential for degradation of lands managed to protect wilderness characteristics or lands found to possess wilderness characteristics within the SDNM, designated wilderness areas within the SDNM would remain protected in perpetuity and such values in those areas would be preserved.

Alternative A

If actions and resource uses from **Section 5.1.2** occur on lands managed to protect wilderness characteristics or lands found to possess wilderness characteristics, these actions could degrade the wilderness characteristics of an area so as to change the outcome of future wilderness characteristics inventories, thereby reducing the acreage of lands with wilderness characteristics within the SDNM. Recreational target shooting management under this alternative would add to these impacts; thus the long-term direct and indirect cumulative impacts on acreage, naturalness, outstanding opportunities for solitude or a primitive and unconfined type of recreation, and supplemental values under this alternative would be minor, but greater than any other alternative due to recreational target shooting being available on all lands managed to protect wilderness characteristics or lands found to possess wilderness characteristics within the SDNM. Impacts would typically occur along roads near the perimeters of these areas, resulting in negligible impacts on the interiors of these areas.

Alternative B

Under Alternative B, the impacts described for past, present, and reasonably foreseeable future actions would be of the same nature as those described under Alternative A. Impacts from recreational target shooting on lands managed to protect wilderness characteristics or lands found to possess wilderness characteristics, would be the same as those described under Alternative A, except that maintaining the restriction on recreational target shooting on 1,800 acres of lands found to possess wilderness characteristics north of the North Maricopa Mountains Wilderness Area would provide minor, localized protection of wilderness characteristics over the long term.

Alternative C

Under Alternative C, the impacts described for past, present, and reasonably foreseeable future actions would be of the same nature as those described under Alternative A. Overall, cumulative impacts would be similar to those described under Alternative A for lands managed to protect wilderness characteristics and lands found to possess wilderness characteristics, except that restricting recreational target shooting on 9,600 acres of lands found to possess wilderness characteristics in the Butterfield Pass area would provide minor, localized protection of wilderness characteristics over the long term. Combined with the actions and activities described in **Section 5.1.2**, implementation of Alternative C would likely result in minor impacts on wilderness characteristics in the Juan Bautista de Anza NHT RMZ because recreational target shooting would be restricted but other recreational activities with the potential to degrade wilderness characteristics may be allowed.

Alternative D

Under Alternative D, the impacts described for past, present, and reasonably foreseeable future actions would be of the same nature as those described under Alternative A. Because recreational target shooting would be restricted on all lands managed to protect wilderness characteristics and would be restricted on most (76 percent) of lands found to possess wilderness characteristics, there would be negligible to minor long-term impacts on wilderness characteristics.

Alternative E

Under Alternative E, the impacts described for past, present, and reasonably foreseeable future actions would be of the same nature as those described under Alternative A. Combined with managing the SDNM as restricted to recreational target shooting, there would be negligible to minor long-term impacts on lands managed to protect wilderness characteristics or lands found to possess wilderness characteristics depending on the location and frequency of uses that may degrade wilderness characteristics.

5.2.8 Wildfire Management

The cumulative impacts analysis area for wildfire management includes the SDNM and the watershed boundaries that overlap and extend beyond the SDNM boundary.

This section describes the cumulative impacts on wildfire management from the incremental impact of the action when added with past, present, and reasonably foreseeable future actions identified as population growth, ROWs, recreation and travel management, livestock grazing, and public safety and hazardous materials.

Effects Common to All Alternatives

Annual variations in climatic conditions may lead to an increase in the continuity of fine fuels which may increase the potential for larger fires. However,

cumulative impacts from past, present and reasonably foreseeable future actions would still maintain a relatively minor wildland fire risk due to fuel type and abundance.

Hazardous materials could pose increased risks to firefighters and the public dependent on the type of hazardous materials. Some materials could accelerate wildfire spread and increase intensity.

Under all alternatives, based on trends discussed in **Section 3.2.8**, the risk of ignitions resulting from recreational target shooting would be negligible to minor. Seasonal prohibitions on recreational target shooting during dry years would further reduce this risk. The severity and size of any resulting wildland fires is difficult to predict and would be dependent upon precipitation and vegetation conditions. As discussed in Chapter 3, vegetation communities in the SDNM are unlikely to carry a fire over large areas.

Alternative A

Cumulative impacts from past, present, and reasonably foreseeable future actions from population growth have increased fire suppression and fuels management priorities and resources necessary to provide for firefighter and public safety, to protect infrastructure, and to protect and improve important resource values. Continued population growth over time would increase the potential for human-caused fires. The potential for fires to be more numerous would occur as fewer use restrictions are proposed under this alternative.

The incremental impacts of Alternative A would result in the highest potential for human-caused fire within the SDNM and the need for the largest number of suppression resources to meet fire management priorities. The potential for cumulative changes in vegetation communities from historical fire regimes would be the highest under this alternative as potential for human caused fire would occur due to the highest public visitation potential and fewer use restrictions applicable to recreational target shooting. Through continued population growth, increased public use of BLM-administered lands, and 486,400 acres available for recreational target shooting, more mitigation measures to reduce impacts would be required.

Past, present, and reasonably foreseeable future ROW actions have increased fire suppression priorities to protect important infrastructure associated with ROWs, such as gas pipelines, power lines, and energy developments. ROW construction of new or improving roads would promote increased human visitation into areas not previously accessible, increasing the potential for human-caused fire. This would be more likely outside the SDNM because the SDNM is managed as a ROW Exclusion area. Improved access would also allow for improved suppression access to suppress wildfire. New access or road maintenance as a result of the issuance of ROWs would increase the potential for establishment and spread of invasive species resulting in increased fuels

loading. Increasing access roads would also serve as fuel breaks in areas and may reduce wildfire spread in areas where fine fuels have established.

Incremental impacts include the need to increase fire suppression resources and implementation of fuels treatments to protect infrastructure. The potential for cumulative changes in vegetation communities from historical fire regimes and destruction of fire intolerant vegetation communities would be dependent on winter and early spring moisture that enhance abundance of annual fuels and create conditions for fine fuel continuity. The number of acres dominated by invasive species would increase the potential for fire spread. ROW permit requirements to control the spread of invasive species and implementation of mitigation measures as described in **Appendix B** would reduce the potential of fuels loading and wildfire spread.

Past, present, and reasonably foreseeable future actions related to recreation and travel management include increased recreation and travel use on BLM-administered lands. Delineating special recreation management areas promotes public visitation and uses of the lands leading to increased potential for human-caused fire and surface disturbance . OHV use also increases visitation, resulting in increased potential for human-caused wildfire.. Incremental impacts include increasing demands for fire suppression resources and the need for implementation of fuels treatments as a result of fuels loading. The potential for cumulative changes in vegetation communities from historical fire regimes and destruction of fire intolerant vegetation communities would be the highest under this alternative and dependent on the number of acres dominated by invasive species as a result of recreation and travel activities.

Past, present, and reasonably foreseeable future actions from livestock grazing include invasive species being spread by livestock, increasing the potential for fuel loadings. Dependent on conditions, the potential for larger fires could occur as a result of invasive plants carrying fire. Livestock management also serves to remove fuels in areas resulting in less intense fires. The potential for cumulative changes in vegetation communities from historical fire regimes and destruction of fire intolerant vegetation communities would be dependent on the number and size of wildfires. Potential for reduced fire intensity could occur in areas where livestock has grazed.

Impacts from past, present, and reasonably foreseeable future actions relating to public safety include increasing fire suppression resources and priorities and fuel treatments in order to protect the public from wildfire. As population and the use of the public lands increase, the need for more suppression resources and fuel breaks increase. Incremental impacts would include safety related issues resulting from recreational target shooting exposing firefighters and fuels management workers and the public to stray bullets. However, with more acres available for recreational target shooting, firefighter, employee, and public exposure to recreational target shooting would be more dispersed.

Implementation of mitigation measures (signage or temporary restrictions) would reduce safety risks associated with recreational target shooting while providing for firefighter and public safety.

Alternative B

Past, present, and reasonably foreseeable future actions and incremental impacts from population growth, ROWs, recreation and travel management, livestock grazing, and public safety and hazardous materials would be the same as those described under Alternative A. There would be no discernible difference in impacts, as only 10,100 acres (or 2 percent) of the decision area would be restricted to recreational target shooting.

Alternative C

Cumulative impacts from past, present, and reasonably foreseeable future actions to wildfire management related to population growth would increase fire suppression and fuels management priorities in order to provide for firefighter and public safety, protect infrastructure, and protect and improve important resource values. Cumulative impacts would be similar to those described under Alternative A. The incremental impacts would result in the slightly lower potential for human-caused fire within the SDNM and slightly lower potential for fuel loading from establishment and spread of invasive species as a result of population growth compared with Alternative A, as approximately 11 percent of the SDNM would be restricted to recreational target shooting.

The number of fire suppression resources necessary to meet fire management priorities would be expected to increase more slowly over time based on fewer acres available to recreational target shooting. The potential for cumulative changes in vegetation communities from historical fire regimes and the destruction of fire intolerant vegetation would also be slightly lower under this alternative due to the reduced visitation potential and 52,800 acres restricted to recreational target shooting. Through continued population growth, increased public use of BLM-administered lands, and availability of 433,600 acres for recreational target shooting, mitigation measures to reduce impacts would be required.

Impacts from past, present, and reasonably foreseeable future ROW actions would be the same as those described under Alternative A, as suppression and fuel treatment priorities to protect important infrastructure associated with ROWs, such as gas pipelines, power lines, energy developments, and construction would not change. Incremental impacts include increasing demands for fire suppression resources and implementation of fuels treatments to protect infrastructure. The potential for cumulative changes in vegetation communities from historical fire regimes and the destruction of fire intolerant vegetation communities would be dependent on the number of acres dominated by invasive species, increasing fire potential and spread. Removing 52,800 acres

from recreational target shooting would reduce some public use and travel and slightly reduce the potential spread of invasive species causing associated fuels loading. ROWs permit requirements to control the spread of invasive species and implementation of mitigation measures as described in **Appendix B** would reduce the potential of fuels loading and wildfire spread.

Impacts from past, present, and reasonably foreseeable future recreation and travel management actions to fire management would be similar to those described under Alternative A. Incremental impacts associated with travel management would potentially restrict those visitors traveling or using the lands for recreational target shooting, of which there would be 11 percent fewer available. RMZ management restricting 52,800 acres to recreational target shooting would reduce some public use and travel and slightly reduce the potential spread of invasive species causing associated fuels loading.

Past, present, and reasonably foreseeable future livestock grazing actions and incremental impacts would be the same as those described under Alternative A.

Impacts from past, present, and reasonably foreseeable future actions relating to public safety include increasing suppression priorities and fuel treatments in order to protect the public from wildfire, which would be similar to those described under Alternative A. Incremental impacts would include safety related issues resulting from recreational target shooting exposing firefighters, and the public to stray bullets. Reducing the number of acres available for recreational target shooting to 433,600 acres would reduce public safety and firefighter target shooting exposure on the 52,800 acres that would be restricted. However, recreational target shooting could concentrate use within the 433,600 acres still available to recreational target shooting, increasing the public safety concerns within those areas. Implementation of mitigation measures (signage or temporary restrictions) would reduce safety risks associated with recreational target shooting while providing for firefighter, employee, and public safety.

Alternative D

Cumulative impacts from past, present, and reasonably foreseeable future actions related to population growth would be similar to those described under Alternative A. The incremental impact of Alternative D would make 166,500 acres (or 34 percent) of the decision area available for recreational target shooting. The potential for human-caused fire and the potential for fuel loading from establishment and spread of invasive species would increase at slower rates compared with Alternative A. However, as population growth and usage relating to other recreation uses increases, the number of fire suppression resources and the number of fuel treatments necessary to meet fire management priorities would still be expected to increase over time. The potential for cumulative changes in vegetation communities from historical fire regimes and the destruction of fire intolerant vegetation would slowly increase over time as visitation from other recreation uses would continue even though

recreational target shooting use would be restricted. Through continued population growth, increased public use of BLM-administered lands, and 166,500 acres available for recreational target shooting, fewer mitigation measures to reduce impacts would be required to manage recreational target shooting.

Impacts from past, present, and reasonably foreseeable future ROW actions would be the same as those described under Alternative A, as suppression and fuel treatment priorities to protect important infrastructure associated with ROWs—such as gas pipelines, power lines, energy developments, and construction—would not change. Incremental impacts include increasing demands for fire suppression resources and implementation of fuels treatments to protect infrastructure. The potential for cumulative changes in vegetation communities from historical fire regimes and the destruction of fire intolerant vegetation communities would be dependent on the number and size of wildfires and fuels loading from invasive species increasing fire potential and spread. Allowing 166,500 acres to be available to recreational target shooting would reduce public use and travel associated with recreational target shooting on 66 percent of lands within the decision area and reduce the potential spread of invasive species causing associated fuels loading. ROWs permit requirements to control the spread of invasive species and implementation of mitigation measures as described in **Appendix B** would reduce the potential of fuels loading and wildfire spread.

Impacts from past, present, and reasonably foreseeable future recreation and travel management actions on fire management would be similar to those described under Alternative A. Incremental impacts associated with travel management would potentially reduce visitors traveling or using the lands for recreational target shooting, of which there would be 66 percent fewer available. However, recreational target shooting may become more concentrated within the 166,500 acres available to recreational target shooting. Allowing 166,500 acres available to recreational target shooting would reduce some public use and travel within the decision area and slightly reduce the potential spread of invasive species causing associated fuels loading.

Impacts from past, present, and reasonably foreseeable future livestock grazing actions and incremental impacts would be the same as those described under Alternative A.

Impacts from past, present, and reasonably foreseeable future actions relating to public safety include suppression priorities and fuel treatments in order to protect the public from wildfire, which would be similar to those described under Alternative A. Incremental impacts would include safety related issues resulting from recreational target shooting exposing firefighters, fuels management workers and the public to stray bullets. Reducing the number of acres available for recreational target shooting to 166,500 acres would reduce public safety and firefighter target shooting exposure on 319,900 acres.

However, recreational target shooting could concentrate use within the 166,500 acres still available to recreational target shooting increasing the potential for human-caused fires associated with recreational target shooting and public safety concerns in areas available to recreational target shooting. Implementation of mitigation measures (signage or temporary restrictions) would reduce safety risks associated with recreational target shooting while providing for public safety.

Alternative E

Cumulative impacts from past, present, and reasonably foreseeable future actions related to population growth would be similar to those described under Alternative A. The incremental impact of Alternative E would restrict 486,400 acres of the decision area for recreational target shooting. The potential for human-caused fire would be somewhat lower. However, as population growth and usage relating to other recreation uses increases, the number of fire suppression resources necessary to meet fire management priorities would still be expected to increase slowly over time. The potential for cumulative changes in vegetation communities from historical fire regimes and the destruction of fire intolerant vegetation would slowly increase over time as visitation from other recreation uses would increase the potential for human caused fire. The degree of impacts would be dependent on the number and size of wildfires in areas dominated by invasive species. Few, if any, mitigation measures relating to recreational target shooting would be required.

Impacts from past, present, and reasonably foreseeable future ROW actions would be the same as those described under Alternative A, as suppression and fuel treatment priorities to protect important infrastructure associated with ROWs, such as gas pipelines, power lines, energy developments, and construction would not change. Incremental impacts include increasing demands for fire suppression resources to protect infrastructure. The potential for cumulative changes in vegetation communities from historical fire regimes and the destruction of fire intolerant vegetation communities would be dependent on the number of acres dominated by invasive species increasing fire potential and spread.

Incremental impacts from restricting 486,400 acres to recreational target shooting would reduce public use and travel associated with recreational target shooting and slightly reduce the potential for human caused fires from recreational target shooting. However other users are expected to increase as a result of population growth.

Impacts from past, present, and reasonably foreseeable future recreation and travel management actions on fire management would be similar to those described under Alternative A. Incremental impacts associated with travel management would potentially reduce travel by those visitors traveling or using the lands for recreational target shooting. However, recreational target

shooting may become more concentrated outside of the SDNM still available to recreational target shooting. Restricting the SDNM to recreational target shooting would reduce some public use and travel within the SDNM and slightly reduce the potential spread of invasive species causing associated fuels loading. Implementation of mitigation measures would reduce potential for impacts.

Impacts from past, present, and reasonably foreseeable future livestock grazing actions and incremental impacts would be the same as those described under Alternative A.

Impacts from past, present, and reasonably foreseeable future actions relating to public safety include suppression priorities and fuel treatments in order to protect the public from wildfire, which would be similar to those described under Alternative A. Incremental impacts would reduce safety related issues resulting from recreational target shooting. Recreational target shooting exposure to firefighters, fuels management workers, and the public would not occur within the SDNM. However, recreational target shooting could concentrate use outside the SDNM still available to recreational target shooting, increasing the public safety concerns on those areas. Few, if any, mitigation measures relating to recreational target shooting would be required within the SDNM under Alternative E.

5.3 Resource Uses

5.3.1 Livestock Grazing

The cumulative impacts analysis area for livestock grazing includes all permitted allotments in and overlapping the SDNM. There are 157,100 acres of permitted allotments available for grazing in the SDNM.

Effects Common to All Alternatives

Under all alternatives, current and foreseeable future actions within the cumulative impacts analysis area with the potential to impact livestock grazing include the direct and indirect disturbance of livestock or range improvements, or the potential for unwanted dispersal due to recreational activities such as recreational target shooting, OHV travel, and camping. Removal of forage may also occur as a result of surface-disturbing activities such as ROW development. Population growth in and around the planning area is likely to result in increased recreation use, urban development, and the conversion of grazing on private lands or other surface management agencies to other uses over the 20-year planning period. Such actions could reduce livestock numbers and forage available for livestock by increasing soil disturbance, vegetation removal, and noxious and invasive weed proliferation. Impacts on livestock grazing could be greater near areas with high recreation use or areas developed for residential, commercial, or industrial uses.

Contributions from recreational target shooting, including disturbance or injury to livestock or damage to range improvements, are likely to be minor when

examined in comparison with other surface-disturbing activities and recreational uses.

Alternative A

Under Alternative A, retaining the opportunity to engage in recreational target shooting activities throughout the planning area would continue to contribute to cumulative livestock disturbance as discussed under *Effects Common to All Alternatives*. Implementation of mitigation measures as described in **Appendix B** would reduce the level of impacts, with impacts varying on a site-specific level depending on methods of mitigation employed.

Alternative B

Under Alternative B, cumulative contributions to livestock disturbance from recreational target shooting would be similar in nature to those discussed under Alternative A, but they would be reduced in scale due to the restriction of recreational target shooting on 9,400 acres with permitted grazing.

Alternative C

Under Alternative C, cumulative contributions to livestock disturbance from recreational target shooting would be similar in nature to those discussed under Alternative A, but they would be reduced in scale due to the restriction of recreational target shooting on 9,500 acres with permitted grazing.

Alternative D

Under Alternative D, cumulative contributions to livestock disturbance from recreational target shooting would be similar in nature to those discussed under Alternative A, but they would be reduced in scale due to the restriction of recreational target shooting on 103,500 acres with permitted grazing.

Alternative E

Under Alternative E, cumulative contributions to livestock disturbance from recreational target shooting would be reduced to negligible levels throughout the entire decision area due to the 100 percent reduction in recreational target shooting. Disturbance of livestock and forage and the reduction in forage would continue to be present from other land uses as discussed under *Effects Common to All Alternatives*.

5.3.2 Recreation Management

The cumulative impacts analysis area for recreation management is the SDNM and all lands within 10 miles of the SDNM boundary. This analysis area captures nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural Gas Company pipeline road along the SDMN's northern boundary.

Effects Common to All Alternatives

Under all alternatives, regional population growth surrounding the SDNM would continue to increase visitation to the SDNM. Those visiting the Desert Back Country RMZ portions of the SDNM are likely to engage in resource dependent, backcountry recreational activities such as hiking, backpacking, and nature photography. The quantity of these backcountry recreational opportunities would not change under any of the alternatives throughout the 20-year temporal scope of analysis.

There would also be opportunities for nonmotorized developed recreation within the Juan Bautista de Anza NHT RMZ. These opportunities would include camping in developed sites, interpretation of historical trail resources, and hiking from trailheads and along developed trails. There would be no cumulative impacts related to the number of facilities, such as trails, trailheads, and camp sites, because the number of these opportunities would be the same across all alternatives.

Recreational target shooting may displace other users to areas outside the SDNM. Because recreational target shooting is allowed across nearby public lands, it is difficult to predict the exact locations where displaced users would recreate. Most likely, they would find suitable opportunities and experiences in areas away from roads, because recreational target shooting is generally associated with access via motorized vehicle. Displacement would be a negligible to moderate impact on other users depending on the comparable quantity and quality of nearby opportunities and experiences for their desired activities.

Recreational opportunities in the SDNM may be limited under any of the alternatives if recreational disturbance thresholds established in the 2012 RMP are exceeded. These thresholds are based on the amount of surface disturbance surveyed in 2003-2005 associated with all recreational use (i.e., including recreational target shooting and other activities; Foti and Chamber 2005). Exceedances may be triggered by disturbance associated with any recreational activity, and resultant closures of an area to recreation would force users to go elsewhere for similar opportunities. These impacts would likely occur over the short term and could be negligible to moderate in intensity depending on the location. Because closures could be attributed to disturbance caused by any recreational activity, the potential for such closures is considered equal across all alternatives.

Alternative A

Managing the SDNM as available to recreational target shooting under Alternative A would preserve recreational target shooting opportunities in the SDNM, but it would cumulatively decrease the quality of other recreational activities taking place in proximity to popular recreational target shooting areas. Noise, a decreased sense of safety, and resource damage and debris in frequently used recreational target shooting areas would displace other

recreational activities from those areas. Visitors most likely to be displaced by recreational target shooting would be those engaged in resource-based activities such as hiking, nature photography, backpacking, and camping. Visitors not able to find other suitable locations within the SDNM would seek similar opportunities outside the SDNM. There would be no displacement of target shooters from the SDNM and no increase in recreational target shooting in nearby areas associated with implementation of this alternative.

Incremental, cumulative impacts on recreation and visitor services from recreational target shooting would decrease the BLM's ability to provide visitors with opportunities to learn about the Juan Bautista de Anza NHT and experience the natural history of the Sonoran Desert, two of the SDNM's principal objects. Alternative A would also cumulatively impact recreation and visitor services by not allowing the BLM to maintain high levels of visitor satisfaction within the SDNM, which is a fundamental principal of the BLM's management for the SDNM ERMA.

Juan Bautista de Anza NHT RMZ

Combined with past, present, and reasonably foreseeable future actions, such as the implementation of proposed actions in the SDNM Juan Bautista de Anza RMZ Recreation Plan (BLM 2016), BLM management of recreational target shooting under Alternative A would have moderate to major cumulative impacts on recreation and visitor services in the Juan Bautista de Anza NHT RMZ. Under the SDNM Juan Bautista de Anza RMZ Recreation Plan, the BLM would rescind the temporary OHV closure that has applied to most routes in the RMZ since 2008. Allowing motorized travel and improving access in the RMZ would increase recreational target shooting opportunities in the RMZ. Noise, debris, and safety concerns from recreational target shooting in the RMZ would conflict with other visitors' ability to interpret historic and natural resources along and surrounding the NHT. Recreational target shooting that occurs adjacent to the NHT, trails, or campground would moderately impact other users, particularly those engaged in nonmotorized activities, by decreasing users' ability to participate in developed and semi-developed recreational activities in a setting similar to that experienced by Juan Bautista de Anza. Recreational target shooting debris, noise, and safety concerns that are of an intensity and location that displace visitors from the RMZ would constitute a major cumulative impact, because the NHT and RMZ are essential to the BLM's overall management of recreation and visitor services in the SDNM.

Desert Back Country RMZ

Past, present, and reasonably foreseeable future actions in the Desert Back Country RMZ would have mostly negligible impacts on recreation and visitor services, particularly within the three wilderness areas (159,100 acres) and lands managed to protect wilderness characteristics (108,100 acres), which are not accessible by motor vehicle and, therefore, are less popular recreational target shooting areas because of fewer designated routes. The exception would be

along the El Paso Natural Gas Company pipeline road and BLM Road 8001, which are popular recreational target shooting areas. Increasing populations within an hour drive of this portion of the SDNM, combined with the expansion of the El Paso Natural Gas Company pipeline road to a four-lane road would increase accessibility and the associated frequency and intensity of recreational target shooting along the SDNM's northern boundary. Over the long term, there would be a decline in the quality of non-recreational target shooting recreational opportunities along the El Paso Natural Gas Company pipeline road and BLM Road 8001. The intensity of recreational target shooting and decline in resource values could displace some users, such as those engaged in nonmotorized, resource-based activities such as hiking, photography, and sightseeing, to other areas in the SDNM or to areas outside the SDNM.

Monitoring and Mitigation

When combined with past, present, and reasonably foreseeable future actions, temporary or permanent restrictions on recreational target shooting as an outcome of monitoring and mitigation would reduce the potential for recreational target shooting to conflict with other recreational activities in the restricted area. However, if other areas in the SDNM remain available and are accessible by motor vehicle, there could be an increase in recreational target shooting in those areas, which would cumulatively reduce the quality of recreational experiences. A permanent restriction would maintain these cumulative impacts over the long term.

After monitoring, the BLM may also implement mitigation measures to reduce the impacts of recreational target shooting without restricting the activity within a given area. Mitigation that maintains recreational target shooting opportunities without reducing the quality of other visitor experiences would reduce the potential for cumulative impacts on recreation.

Alternative B

Restricting recreational target shooting on 10,100 acres (2 percent) of the decision area along BLM Road 8001 and the El Paso Natural Gas Company pipeline road under Alternative B would improve the quality of other recreational opportunities in the restricted area. Although the restricted area represents only 2 percent of the decision area, it would represent a disproportionately larger cumulative impact on recreation and visitor services. This is because the restriction would apply to one of the most popular recreational target shooting areas in the SDNM. Recreational target shooting activities displaced from popular recreational target shooting areas in the northern portion of the SDNM would seek other nearby opportunities within and outside the SDNM. Alternative B would impact recreation and visitor services on nearby BLM-administered lands to the north of the El Paso Natural Gas Company pipeline road.

Compared with Alternative A, increasing the number of acres restricted to recreational target shooting would improve the BLM's ability to provide visitors with the ability to experience the objects for which the Monument was designated and to meet the principal objective for the SDNM ERMA.

Juan Bautista de Anza NHT RMZ

Over time, the restriction could cumulatively decrease recreational experiences in other parts of the SDNM, such as within the Juan Bautista de Anza NHT RMZ, as more frequent and intense recreational target shooting impacts activities and user experiences in those areas. Implementation of improvements under the SDNM Juan Bautista de Anza RMZ Recreation Plan would likely increase visitation to the Juan Bautista de Anza RMZ. Recreational target shooters displaced from the restricted area would increase the potential for conflict with new developed recreational opportunities, such as camping, hiking, and interpretation of NHT resources. Increased resource damage and more frequent noise from recreational target shooting combined with an overall increase in visitation would diminish non-recreational target shooter satisfaction with recreational opportunities in the RMZ and impair users' ability to interpret the NHT. The potential for declines in visitor satisfaction would be highest where recreational target shooting occurs adjacent to the NHT and developed recreation sites.

Desert Back Country RMZ

Alternative B would cumulatively enhance recreational experiences for visitors not engaged in recreational target shooting within the Desert Back Country RMZ. Roadway improvements for the El Paso Natural Gas Company pipeline road would enhance visitor access to the northern portion of the SDNM, while restrictions on target shooting along BLM roads 8000 and 8001 would decrease or eliminate the potential for impacts on recreational and visitor experiences in those areas.

It is unlikely that enough recreational target shooters displaced from the restricted area would seek other opportunities elsewhere in the Desert Back Country RMZ. Accordingly, impacts from past, present, and reasonably foreseeable actions under Alternative B in the remaining 99 percent (427,600 acres) of the RMZ would be the same as Alternative A. Recreational target shooters displaced from the restricted portion of the RMZ would most likely seek similar opportunities within the Juan Bautista de Anza NHT RMZ or on publicly managed lands outside the SDNM.

Monitoring and Mitigation

Impacts from monitoring and mitigation would be similar to those under Alternative A. The need for mitigation would be unlikely in the restricted area. Mitigation resulting in temporary or permanent restrictions would provide the greatest protections from cumulative impacts associated with recreational target shooting in the Juan Bautista de Anza NHT RMZ, particularly if applied in areas

directly adjacent to the NHT and near trailheads, campgrounds, and developed sites.

Mitigation measures that do not restrict recreational target shooting would be most effective at reducing cumulative impacts on recreation and visitor services in the Juan Bautista de Anza NHT RMZ.

Alternative C

Past, present, and reasonably foreseeable future actions under Alternative C would improve recreational experiences and the potential for visitor displacement in the Juan Bautista de Anza NHT RMZ. Restricting recreational target shooting in the portion of the SDNM most intensely used by other recreationists would eliminate the potential for conflicts with hiking, camping, and other developed activities in the SDNM. Maintaining available recreational target shooting areas along BLM Road 8001 would also minimize the displacement of recreational target shooting impacts on areas outside the SDNM.

Juan Bautista de Anza NHT RMZ

Restricting recreational target shooting in the RMZ would eliminate the potential for noise, resource damage, and safety concerns associated with recreational target shooting and conflicts with the other recreationists' experiences. Combined with past, present and reasonably foreseeable future actions, such as the implementation of recreational improvements in the SDNM Juan Bautista de Anza RMZ Recreation Plan, Alternative C would cumulatively increase the quality of developed and undeveloped recreational and interpretive opportunities and experiences in the RMZ. Restricting recreational target shooting in the RMZ would increase the BLM's ability to provide visitors with educational opportunities consistent with the ERMA objectives and Monument designation proclamation.

Desert Back Country RMZ

There would be an increase in the potential for cumulative impacts in the Desert Back Country RMZ as recreational target shooters displaced from the Juan Bautista de Anza NHT RMZ would seek other opportunities in the Desert Back Country RMZ. Combined with improvements for the El Paso Natural Gas Company pipeline road that would improve access to the SDNM, Alternative C would increase recreational target shooting activity along the El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001 in the northwestern portion of the SDNM. Target shooters may also be displaced to other areas both inside and outside of the Monument. There would be the potential for increased conflicts and displacement of non-recreational target shooting users in that area. Increased resource damage, debris, noise, and a reduced sense of safety would reduce visitors' ability to interpret the natural history of the Sonoran Desert in this area, resulting in long-term visitor displacement and

reduced satisfaction with recreational opportunities in this area and with the SDNM as a whole.

Restricting the Juan Bautista de Anza NHT RMZ to recreational target shooting could also result in a minor increase in recreational target shooting activity and associated impacts in the Desert Back Country RMZ south of SR 238. Isolated resource damage and debris from recreational target shooting activities adjacent to motorized routes would result in negligible cumulative impacts on visitors' overall backcountry recreational experiences in the SDNM.

Monitoring and Mitigation

Mitigation measures would result in fewer cumulative impacts upon other recreation activities and visitor services. Mitigation that permanently restricts the area along BLM Road 8001 from continued recreational target shooting would improve the quality of other recreational experiences. Temporary restrictions would eliminate noise, safety, and resource-related impacts in the short term, but they would not be permanent. Applying mitigation measures that continue to manage areas as available for recreational target shooting would maintain the potential for cumulative impacts on other recreationists. However, the intensity and frequency of impacts could be less, especially if the mitigation is intended to reduce impacts on other recreationists.

Limiting or restricting recreational target shooting along BLM Road 8001 under Alternative C would displace most of the remaining recreational target shooting activities to publicly managed lands outside the SDNM. There could be an increase in user conflicts and visitor displacement in areas such as Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly north of the El Paso Natural Gas Company pipeline road.

Alternative D

Combined with past, present, and reasonably foreseeable future actions, Alternative D would better protect Monument objects and reduce the potential for resource damage, debris, and noise from recreational target shooting and conflicts with the objectives of the SDNM ERMA when compared with Alternative A.

Juan Bautista de Anza NHT RMZ

Cumulative impacts in the Juan Bautista de Anza NHT RMZ would be the same as those under Alternative C.

Desert Back Country RMZ

Restricted areas outside the Juan Bautista de Anza NHT RMZ under Alternative D are less popular recreational target shooting areas because of the lack of motorized vehicle access. Accordingly, although Alternative D would eliminate recreational target shooting opportunities on 267,200 more acres of the RMZ than Alternative A, there would be little to no increase or decrease in cumulative impacts on recreation and visitor services in the RMZ.

Monitoring and Mitigation

Cumulative impacts from mitigation would be the same as those under Alternative C. It would be unlikely that mitigation measures would be needed to address any impacts in wilderness areas or lands managed to protect wilderness characteristics, because these areas would be restricted under Alternative D.

Alternative E

Restricting the entire SDNM to recreational target shooting would maintain and improve the experiences and opportunities for other recreational activities. Improvements would be most noticeable in the Juan Bautista de Anza NHT RMZ and the northwestern corner of the SDNM along the El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001 where recreational target shooting is most popular. These changes would cumulatively increase the BLM's ability to provide visitors with opportunities to experience the objects for which the Monument was designated and to meet the principal objectives for the SDNM ERMA.

Restricting recreational target shooting in the SDNM would displace the activity to other publicly managed lands outside the SDNM. Accordingly, there would likely be more impacts on other recreational activities occurring on nearby BLM-administered lands, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural Gas Company pipeline road along the SDNM's northern boundary. Displacement of non-target shooting recreationists in these areas could increase visitation to the SDNM.

5.3.3 Recreational Target Shooting

The cumulative impacts analysis area for recreational target shooting is the SDNM and all lands within 10 miles of the SDNM boundary. This analysis area captures nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural Gas Company pipeline road along the SDMN's northern boundary.

Effects Common to All Alternatives

Wilderness areas and lands managed to protect wilderness characteristics would continue to be unpopular areas for recreational target shooting, because there is no motorized vehicle access. There would be negligible cumulative impacts on recreational target shooting from the management of these areas.

Under all alternatives, the BLM would monitor the cumulative impacts from recreational target shooting in the SDNM and apply mitigation measures as appropriate. Combined with past, present, and reasonably foreseeable future actions, mitigation measures that result in temporary or permanent restrictions would reduce or eliminate recreational target shooting activities resulting in moderate to major cumulative impacts on the activity. Mitigation that maintains areas as available would preserve recreational target shooting opportunities, but

it could limit the ways users engage in the activity. This type of mitigation would result in a negligible to moderate impact depending on the intensity and duration of the measure being taken.

Nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, and Palo Verde Hills, would continue to provide desirable opportunities for visitors seeking a dispersed recreational target shooting experience. Displacement of target shooters may result in crowding and associated safety concerns. These impacts would be most noticeable under alternatives that close popular recreational target shooting areas in the Monument. The magnitude of these impacts is difficult to determine because the exact locations where displaced target shooters would move to is unknown. The areas listed above would likely become more popular for recreational target shooting, with potential for crowding and associated safety issues.

Recreational target shooting opportunities in the SDNM may be limited under any of the alternatives if recreation disturbance thresholds established in the 2012 RMP are exceeded (See **Appendix B**). These thresholds are based on the amount of surface disturbance surveyed in 2003-2005 associated with all recreational use (i.e., including recreational target shooting and other activities; Foti and Chamber 2005). Exceedances may be triggered by disturbance associated with other recreational activities, but resultant closures of an area to recreation would also result in restrictions on recreational target shooting. These impacts would likely occur over the short term and could be negligible to moderate in intensity depending on the location. Because closures could be attributed to disturbance caused by any recreational activity, the potential for such closures is considered equal across all alternatives.

In very dry conditions, seasonal fire restrictions could be implemented to lessen the chance of human-caused wildfires. These restrictions also apply to the discharge of firearms, resulting in a seasonal restriction in the SDNM and nearby recreational target shooting areas. When implemented, these restrictions would continue to result in a major short-term impact on dispersed recreational target shooting and could occur under any alternative depending on meteorological conditions.

Alternative A

Managing the entire SDNM as available for recreational target shooting would result in negligible cumulative impacts on recreational target shooting within or near the SDNM. Improvements proposed for the El Paso Natural Gas Company pipeline road and BLM roads within the Juan Bautista de Anza NHT RMZ, combined with the BLM's management of routes as available for motorized travel in the RMZ, would increase access to recreational target shooting opportunities. Because the entire Monument would be available for recreational target shooting, there would be little or no displacement of target shooters from the SDNM to other nearby areas.

Mitigation described in **Appendix B** could result in some areas being temporarily or permanently restricted to recreational target shooting. If these restrictions are applied, there would be fewer recreational target shooting opportunities in the SDNM over the short or long term. Similarly, mitigation specifically implemented to reduce recreational target shooting impacts without restricting the activity altogether could affect how and where users participate in the activity. In either scenario, mitigation would displace some target shooters to other portions of the SDNM or other nearby areas. The intensity of the impact would depend on the type, extent, and duration of the mitigation measures. If recreational target shooting is restricted in popular areas within the SDNM, it could lead to crowding at other nearby areas commonly used for dispersed recreational target shooting.

Alternative B

Combined with past, present, and reasonably foreseeable future actions, Alternative B would result in moderate to major cumulative impacts on recreational target shooting opportunities, because the restricted area is one of the most popular recreational target shooting areas in the SDNM. Alternative B would likely displace target shooters to nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural the Gas Company pipeline road along the SDNM's northern boundary. Over time, these areas could become more crowded, pushing recreational target shooting to other new areas or causing target shooters to stop engaging in this activity. Remaining opportunities for recreational target shooting in the decision area that are also accessible via motorized vehicle would mainly include the 48,700 acres of available areas in the Juan Bautista de Anza NHT RMZ and areas east of the South Maricopa Mountains Wilderness near SR 238.

Cumulative impacts from monitoring and mitigation that temporarily or permanently restrict areas to recreational target shooting would further reduce opportunities for recreational target shooting in the SDNM and may force target shooters to go elsewhere. The intensity of the impacts would depend upon the location of the restricted areas and the duration of the restriction. If the BLM imposes restrictions in the Juan Bautista de Anza NHT RMZ and areas directly south of SR 238, then those restrictions would eliminate most or all remaining popular recreational target shooting opportunities in the SDNM. Target shooters would most likely seek opportunities on publicly managed lands outside the SDNM, such as at Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural the Gas Company pipeline road along the SDNM's northern boundary.

Mitigation measures that do not restrict recreational target shooting would preserve recreational target shooting opportunities, but they could change how target shooters participate in the activity. These types of mitigation measures

could lead some target shooters to seek nearby opportunities within or outside the SDNM.

Alternative C

Restricting the Juan Bautista de Anza NHT RMZ to recreational target shooting would result in minor cumulative impacts on recreational target shooting opportunities in the SDNM. Under the SDNM Juan Bautista de Anza RMZ Recreation Plan, the BLM would have more opportunities to access the RMZ by motor vehicle. Compared with Alternative A, Alternative C would restrict recreational target shooting in these newly accessible areas of the SDNM. However, managing popular recreational target shooting areas along the El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001 in the northwestern portion of the SDNM would preserve the majority of existing recreational target shooting opportunities. Target shooters displaced from the Juan Bautista de Anza NHT RMZ would likely relocate to the available areas in the northwestern portion of the SDNM or seek similar opportunities on nearby lands outside the SDNM.

Combined with past, present, and reasonably foreseeable future actions, mitigation measures that temporarily or permanently restrict recreational target shooting along the El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001 would result in major cumulative impacts on recreational target shooting opportunities because this area is valued by target shooters. The extent and duration of any cumulative impact would depend on the location and size of the restricted area and whether the restriction would be temporary or permanent. Both types of restrictions would displace target shooters to nearby areas outside the SDNM, particularly the area directly north of the El Paso Natural Gas Company pipeline road.

Maintaining recreational target shooting in popular areas, such as those along the El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001, would preserve recreational target shooting opportunities but could affect how users participate in the activity. More stringent measures would likely displace the activity to available areas outside of the SDNM.

Alternative D

Although Alternative D would increase the portion of the decision area restricted to recreational target shooting by 267,100 acres, cumulative impacts would be similar to those described under Alternative C. This is because wilderness areas and lands managed to protect wilderness characteristics prohibit motorized vehicle access and are, therefore, are less popular recreational target shooting areas because of fewer designated routes. As under Alternative C, Alternative D would preserve recreational target shooting opportunities over the long term at popular, easily accessible locations, such as along the El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001.

The potential for cumulative impacts from mitigation would be the same as those described under Alternative C.

Alternative E

Alternative E would result in major cumulative impacts on recreational target shooting by restricting all recreational target shooting opportunities within the SDNM. Target shooters would move to other nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly north of the El Paso Natural Gas Company pipeline road. There would be more crowding at these locations than under any other alternative, because more target shooters would be displaced. Over the long term, this would likely lead to the informal establishment of dispersed recreational target shooting areas on other lands farther from the SDNM, or it may cause target shooters to stop engaging in this activity due to distance and other factors. In the SDNM, monitoring would ensure the proposed restriction of the SDNM to recreational target shooting would be enforced and there would be no additional cumulative impacts from mitigation.

5.3.4 Travel Management

The cumulative impacts analysis area for travel management is the SDNM and all lands within 10 miles of the SDNM boundary. This analysis area captures nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural Gas Company pipeline road along the SDMN's northern boundary.

Effects Common to All Alternatives

Under all alternatives, past, present, and reasonably foreseeable future actions would include an increasing regional population and ongoing improvements to non-BLM roads within and surrounding the SDNM. A larger regional population would increase the potential for increased number of motor vehicles in the SDNM, particularly on arterial roads and highways such as the El Paso Natural Gas Company pipeline road, SR 238, and I-8. Improvements designed to accommodate growing regional traffic demands would help to mitigate any decrease in travel times and the public's ability to access the SDNM.

Alternative A

Visitors requiring access for recreational target shooting would continue to place a demand on roads, primitive roads, and trails managed as open for motorized access in the SDNM. Cumulative impacts on roadways not used to access recreational target shooting would be negligible. There would be minor cumulative impacts on BLM Roads 8000, 8001, 8002, 8032, and 8034 because these provide access to popular recreational target shooting areas. Assuming the BLM approves the SDNM Juan Bautista de Anza RMZ Recreation Plan Final EA (BLM 2016), there would also be minor cumulative impacts from recreational target shooters using routes in the RMZ. Cumulative impacts would be minor, because Alternative A would disperse recreational target

shooting opportunities throughout the SDNM, thereby limiting the potential for impaired access for nonmotorized users in any one area.

Monitoring and mitigation under Alternative A could result in some areas being temporarily or permanently restricted to recreational target shooting. Both types of restrictions would result in moderate cumulative impacts on travel management on routes used frequently to access recreational target shooting opportunities. On routes accessing temporarily or permanently restricted areas, there would be fewer motorized vehicles, safety related access, and conflicts with pedestrians and equestrians.

Mitigation measures that maintain areas as available for recreational target shooting would result in continued potential for cumulative impacts on travel management. Mitigation specifically implemented to reduce congestion associated with recreational target shooting and to improve access would support travel management objectives.

Alternative B

Combined with past, present, and reasonably foreseeable future actions, Alternative B would minimize cumulative impacts in the SDNM from recreational target shooting. Restricting recreational target shooting adjacent to BLM Roads 8000 and 8001 would result in a moderate change in the frequency and intensity of vehicle travel on the roadways, because there would be fewer target shooters using the roads for access. Although the restricted area would apply to only 7 percent (42 miles) of all roads—including primitive roads and trails—in the SDNM, reducing travel on these roadways would result in a disproportionately larger decrease in the overall impacts on travel management associated with recreational target shooting because these roads are used to access a popular recreational target shooting area.

Restricting recreational target shooting along the El Paso Natural Gas Company pipeline road and BLM Roads 8000 and 8001 would shift a portion of the existing activity to other locations within and outside the SDNM. BLM Roads 8002, 8003, 8032, 8034, and 8039 and other BLM routes designated as open for motorized travel within and directly outside the SDNM could experience minor cumulative impacts, such as increased motorized vehicle travel and more rapid surface deterioration.

Mitigation measures that result in temporary or permanent restrictions would reduce the potential for vehicle use associated with recreational target shooting to impact travel management. The intensity of any cumulative impacts would depend upon the location of the restricted areas and whether the restriction would be temporary or permanent.

Mitigation measures that do not restrict recreational target shooting would be most effective at reducing impacts on travel management in areas easily accessed by SR 238. Other areas and routes are either closed to motorized

travel or not easily accessible from nearby population centers via paved roadways.

Alternative C

Under Alternative C, there would be a minor improvement in access and safety compared with Alternative A. Restricting recreational target shooting in the Juan Bautista de Anza RMZ would reduce the number of motorized vehicles and improve access for nonmotorized travelers. However, because the closure of the RMZ to motorized travel between 2008 and 2016 limited recreational target shooting opportunities and because areas along the El Paso Natural Gas Company pipeline road are more frequently used recreational target shooting areas, Alternative C would result in negligible cumulative impacts on travel management.

Temporary or permanent mitigation measures would be most effective at reducing cumulative impacts on travel management if implemented along BLM Road 8001, because this area is one of the most valued for target shooters. Mitigation measures that continue to manage areas adjacent to BLM Road 8001 as available for recreational target shooting would maintain the potential for access and safety concerns unless the mitigation is specifically intended to reduce those impacts. Temporary and permanent restrictions would reduce cumulative impacts on travel management from recreational target shooting. The intensity of any cumulative impacts would depend upon the location of the restricted areas and whether the restriction would be temporary or permanent.

Alternative D

Cumulative impacts under Alternative D would be the same as those under Alternative C.

Alternative E

Alternative E would eliminate the potential for motor vehicle travel associated with recreational target shooting. Monitoring would ensure that recreational target shooting restrictions would be enforced, and the potential for impacts on travel management would be reduced as visitors seeking access to recreational target shooting experiences would do so outside of the SDNM. Target shooters seeking alternative recreational target shooting locations would increase travel on other BLM and non-BLM roads that provide access to other popular areas outside the SDNM, such as Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly north of the El Paso Natural Gas Company pipeline road.

5.4 Special Designations

5.4.1 National Conservation Lands

For an analysis of cumulative impacts on National Conservation Lands and the objects the SDNM was designated to protect, refer to the following sections listed in **Table 5-3**, below.

Table 5-3
Sonoran Desert National Monument Objects

Object	Section Describing Impacts on Object
Functioning desert ecosystem	5.2.4, Soils
	5.2.5, Vegetation
Diversity of plant and animal species	5.2.5, Vegetation
	5.2.3, Priority Wildlife Species and Habitat
Saguaro cactus forests	5.2.5, Vegetation
Sand Tank Mountains	5.2.5. Vegetation
Scientific analysis of plant species and climates	5.2.5, Vegetation
	5.2.2, Cultural and Heritage Resources
Vegetation communities: Creosote Bush-Bursage, Desert Grassland, and Washes	5.2.4, Soil Resources
	5.2.5, Vegetation
Wildlife	5.2.3, Priority Wildlife Species and Habitat
Archaeological and historic sites	5.2.2, Cultural and Heritage Resources

5.4.2 Congressional Designations

The cumulative impacts analysis area for wilderness areas includes Maricopa, Pima, and Pinal Counties. The cumulative impacts analysis area for the Juan Bautista de Anza NHT is the SDNM and all lands within 10 miles of the SDNM boundary. The NHT corridor is comprised primarily of private and state lands to the west and east of the SDNM. Because public access to these lands is limited, impacts on the public's ability to experience the NHT corridor would be limited to BLM-administered lands.

Congressional designations analyzed in this section include the North Maricopa Mountains, South Maricopa Mountains, and Table Top Wilderness areas, and the Juan Bautista de Anza NHT.

Effects Common to All Alternatives

There would be no impacts on special designations that are common under all alternatives.

Alternative A

Wilderness Areas

Based on current conditions and trends, recreational target shooting would continue to be uncommon in designated wilderness areas. As a result, impacts would be mostly indirect and result from noise or other disturbances associated with recreational target shooting around the perimeter of wilderness boundaries. As a result, other past, present, and reasonably foreseeable future actions are expected to have a greater influence on cumulative impacts on designated wilderness areas. These actions are described in detail below.

Population growth in Maricopa, Goodyear, Buckeye, and Gila Bend and the resulting increase in recreational use are expected to have a localized to region-

wide, direct, and indirect impacts on wilderness areas in the analysis area over the 20-year planning time frame. The North Maricopa Mountains, South Maricopa Mountains, Sierra Estrella, and Table Top wilderness areas, and areas with good hiking trails and good paved road access would be most influenced with increased visitation, more vehicular incursions, growing trail and off-trail recreational use, and exposure to the sights and sounds of adjacent human activities. Moreover, the North Maricopa Mountains, South Maricopa Mountains, and Sierra Estrella wilderness areas each border federal, private, and state lands annexed into cities and slated for large-scale residential development, transportation corridors, and solar energy development. Solitude opportunities and the perception of natural landscapes may be impaired the most due to more people and visitor-to-visitor contacts, greater noise, and more urban light impacts. The majority of the impacts on wilderness qualities of these four areas described above would occur in the perimeter areas that are easily reached, or impacted by adjacent activities or development. However, the interiors of these four areas described above should protect wilderness qualities over the life of the plan.

The Woolsey Peak and Signal Mountain wilderness areas may experience moderate visitor use increases, anticipate moderately increased amounts of motorized recreational use along their boundaries, and be subject to increased noise and light pollution. Wilderness values, on the whole, would remain as they are today as the two areas are rugged and remote, lack any visitor amenities, and have no hiking or equestrian trails. The Table Top and South Maricopa Mountains wilderness areas would continue to be subject to ongoing levels of incursions by drug smugglers and human traffickers. Over the long term, smuggling-related roads, trails, lookouts, and illegal dumping would continue, damaging wilderness values and discouraging primitive recreational opportunities. This resource damage and decline in primitive recreational opportunities, while not irreversible, is difficult to reclaim and restore.

The impacts from the past, present, and reasonably foreseeable future actions described above would result in localized to region-wide, moderate, short- and long-term, direct, and indirect impacts on opportunities for visitors to experience naturalness and untrammeled and undeveloped wilderness, and opportunities for visitors to experience solitude, or primitive and unconfined recreation. Overall, in the next 20 years, designated wilderness areas would be primarily affected by the number and proximity of adjacent motorized travel corridors, the volume and type of traffic on those corridors, the sights and sounds of urbanizing human development near or on the borders of wilderness, continuing human and drug smuggling impacts on the Borderlands, the intensity of military and civilian overflights, and the quantity and type of recreational users.

Alternative A would result in site-specific to localized long-term, minor to moderate, direct, and indirect impacts on opportunities for visitors to

experience naturalness, and untrammeled and undeveloped wilderness from disturbances to the landscape from recreational target shooting and potential wildfires. Alternative A would result in localized, moderate, short-term, direct, and indirect impacts on opportunities for visitors to experience solitude, primitive and unconfined recreation from recreational target shooting noise and safety concerns, and motor vehicle noise and travel on designated routes near the wilderness areas.

When the impacts from Alternative A are combined with the impacts under past, present, and reasonably foreseeable future projects, the short- and long-term, cumulative impacts on visitors' opportunities to experience naturalness and untrammeled and undeveloped wilderness would be region-wide, moderate, direct, and indirect because of air pollutants, occurrence of indigenous species, altered water flow, altered disturbance regimes, structures, and use of motor vehicles, motorized equipment, or mechanical transport.

When the impacts from Alternative A are combined with the impacts under past, present, and reasonably foreseeable future projects, the short- and long-term, cumulative impacts on visitors' opportunities to experience solitude and primitive and unconfined recreation would be region-wide, moderate, direct, and indirect because of development of facilities that decrease self-reliant recreation, management restrictions on visitor behavior, the sights and sounds of people inside wilderness, and the sights and sounds of occupied and modified areas outside the wilderness.

Alternative A would have the greatest contribution to overall cumulative impacts, because recreational target shooting would be available in and adjacent to all three wilderness areas in the SDNM. However, the impacts from recreational target shooting would be a minor contribution to cumulative impacts in the three-county cumulative analysis area. The impacts would typically occur near the perimeters of wilderness areas only, resulting in negligible impacts on the majority of wilderness areas.

Juan Bautista de Anza National Historic Trail

The Anza NHT is a cultural resource of national significance. Cumulative impacts on the trail's integrity must be considered, including the visual impacts of land uses on the historic trail corridor. Impacts that enhance or degrade the visual resource, recreational values, and the integrity of the setting, feeling, and historic association with the trail need to be analyzed.

Trail segments within the SDNM remain one of the least disturbed landscapes along the entire 1,200-mile length of the Anza NHT. This physical and cultural setting is protected by National Monument status, but the Anza NHT would be impacted by increased public interest and use, growing urbanization to the north and east outside of the SDNM, and fragmented land ownership and uses in other parts of the cumulative analysis area.

The Anza NHT is primarily affected by OHV use and the existing and proposed ROWs for transportation, communication, and energy developments. To a lesser extent, visitation of the NHT would also affect its integrity. Population growth and the resulting increase in recreational use are expected to have a significant impact on the NHT and its historic landscape setting. Additional population, particularly in the Maricopa and Pinal County areas would result in more recreational use of the NHT, which would increase OHV traffic along the trail corridor over the life of the plan. These new transportation corridors and routes would be likely to alter the choices of where the public comes to target shoot.

New roads would cross the trail in potentially many areas outside the SDNM, especially to the east. The roads would all impair or destroy the natural character of the landscape. Other state and private lands east of the Monument would become both urbanized and residential. Trail values would be lost in these areas. Indirect impacts on the Anza NHT would include visual and audible degradation.

Implementation of large road or energy projects in the corridor outside of the SDNM would forever change the landscape of this area, irreparably degrade the integrity of the Anza NHT, and diminish the public's experience and understanding of the historic expedition and the cultural landscape of that period. The continuing decline in air quality and the regional haze of smog and dust in the central and southwest parts of Arizona would reduce the long-range vistas once enjoyed by trail visitors.

Urbanization would impact the historic feel of the landscape and the dark night skies of the area, which is another important experience enjoyed by visitors to the desert.

The impacts from the past, present, and reasonably foreseeable future actions described above would result in direct loss, damage, or destruction of the physical environment of the trail corridor, including site or historic trail elements, artifacts, and associated cultural sites. This would result in site-specific to localized, long-term, moderate, direct, and indirect impacts on the physical environment and historic setting.

Alternative A would result in site-specific to localized long-term, moderate, direct impacts on the physical environment and historic setting from recreational target shooting. Noise and perceived safety risks would result in localized, short-term, moderate, direct impacts on visitors' experiences in the corridor. Vehicle noise and travel would result in localized, short-term, moderate, indirect impacts on visitors' experiences in the corridor. Potential wildfires from recreational target shooting would result in localized, long-term, negligible to moderate, indirect impacts on the physical environment and historic setting.

When the impacts from Alternative A are combined with the impacts under past, present, and reasonably foreseeable future projects, the short- and long-term, cumulative impacts on the physical environment and historic setting would be region-wide, moderate, direct, and indirect because of ground disturbance from recreational target shooting and potential wildfires, and diminished opportunities for visitors to experience the historic setting from noise and visual disturbances.

Alternative A would have the greatest contribution to overall cumulative impacts, because recreational target shooting would be available in and adjacent to the entire NHT corridor in the SDNM. However, the impacts from recreational target shooting would be a minor contribution to cumulative impacts in the three-county analysis area.

Alternative B

Wilderness Areas

The impacts of past, present, and reasonably foreseeable future projects on opportunities for visitors to experience naturalness and untrammeled and undeveloped wilderness, and opportunities for visitors to experience solitude, or primitive and unconfined recreation would be the same as described under Alternative A.

Alternative B would result in similar impacts as described under Alternative A, resulting in site-specific to localized, long-term, minor to moderate, direct, and indirect impacts on opportunities for visitors to experience naturalness and untrammeled and undeveloped wilderness, and localized, moderate, short-term, direct and indirect impacts on opportunities for visitors to experience solitude, and primitive and unconfined recreation. However, the restriction area on the northern perimeter of the North Maricopa Mountains Wilderness would eliminate direct and indirect impacts from recreational target shooting and motor vehicles in this area, resulting in minor impacts on opportunities to experience wilderness qualities.

Overall cumulative impacts would be the same as those described under Alternative A. When the impacts from Alternative B are combined with the impacts under past, present, and reasonably foreseeable future projects, the short- and long-term, cumulative impacts on visitors' opportunities to experience wilderness qualities would be region-wide, moderate, direct, and indirect.

Under Alternative B, approximately 2 percent of the decision area would be restricted to recreational target shooting, including areas adjacent to the eastern and northern boundaries of the North Maricopa Mountains Wilderness. Overall, because a small percentage of the SDNM adjacent to wilderness areas would be restricted, Alternative B would have nearly the same contribution to overall cumulative impacts from recreational target shooting.

Juan Bautista de Anza National Historic Trail

The impacts of past, present, and reasonably foreseeable future projects on the physical environment and historic setting and on opportunities for visitors to experience the historic setting would be the same as those described under Alternative A.

The impacts on the physical environment and historic landscape setting of the NHT corridor would be the same as those described under Alternative A. Recreational target shooting would continue to diminish visitors' opportunities to experience the historic landscape settings.

The cumulative impacts on the NHT corridor would be the same as those described under Alternative A. When the impacts from Alternative B are combined with the impacts under past, present, and reasonably foreseeable future projects, the short- and long-term, cumulative impacts on the physical environment and historic setting would be region-wide, moderate, direct, and indirect because of ground disturbance from recreational target shooting and potential wildfires, and diminished opportunities for visitors to experience the historic setting from noise and visual disturbances.

Alternative B would have the same contribution to overall cumulative impacts as described under Alternative A.

Alternative C

Wilderness Areas

The impacts of past, present, and reasonably foreseeable future projects on opportunities for visitors to experience naturalness and untrammeled and undeveloped wilderness, and opportunities for visitors to experience solitude, or primitive and unconfined recreation would be the same as those described under Alternative A.

Alternative C would result in similar impacts as described under Alternative A, resulting in site-specific to localized, long-term, minor to moderate, direct, and indirect impacts on opportunities for visitors to experience naturalness and untrammeled and undeveloped wilderness, and localized, moderate, short-term, direct, and indirect impacts on opportunities for visitors to experience solitude, and primitive and unconfined recreation. However, the restriction in the Juan Bautista de Anza NHT RMZ area would eliminate direct and indirect impacts from recreational target shooting and motor vehicles in this area, resulting in minor impacts on opportunities to experience wilderness qualities in the eastern and southern boundaries of the North Maricopa Mountains Wilderness.

Overall cumulative impacts would be the same as those described under Alternative A. When the impacts from Alternative C are combined with the impacts under past, present, and reasonably foreseeable future projects, the short- and long-term, cumulative impacts on visitors' opportunities to

experience wilderness qualities would be region-wide, moderate, direct, and indirect.

Under Alternative C, approximately 11 percent of the decision area would be restricted to recreational target shooting. Overall, because only a small percentage of the SDNM would be restricted, including areas adjacent to the eastern and southern boundaries of the North Maricopa Mountains Wilderness, Alternative C would have nearly the same contribution to overall cumulative impacts as Alternative A from recreational target shooting.

Juan Bautista de Anza National Historic Trail

The impacts of past, present, and reasonably foreseeable future projects on the physical environment and historic setting, and on opportunities for visitors to experience the historic setting would be the same as those described under Alternative A.

Restricting recreational target shooting in the 52,800-acre RMZ would eliminate the potential for noise, resource damage, and safety concerns in the NHT corridor associated with recreational target shooting. Compared with Alternative A, this alternative would result in observable improvements in protection of the physical environment and opportunities for visitors to experience the historic setting of the NHT corridor. Restricting the RMZ would have a beneficial effect on the historic setting, resulting in localized, negligible to minor, long-term, direct, and indirect impacts on visitors' opportunities to experience the NHT corridor's historic setting.

The elimination of recreational target shooting-related noise and safety concerns in these areas would result in localized, negligible, short-term, direct impacts on visitors' opportunities to experience the historic setting. The impacts from motor vehicle noise on designated routes adjacent to the NHT corridor would be reduced.

Overall cumulative impacts would be reduced compared with those described under Alternative A. When the impacts from Alternative C are combined with the impacts under past, present, and reasonably foreseeable future projects, the short- and long-term, cumulative impacts on the physical environment and visitors' opportunities to experience the NHT corridor would be reduced. Restricting recreational target shooting would be a negligible to minor reduction in the overall impacts on the NHT corridor in the cumulative analysis area.

Alternative D

Wilderness Areas

The impacts of past, present, and reasonably foreseeable future projects on opportunities for visitors to experience naturalness and untrammeled and undeveloped wilderness, and opportunities for visitors to experience solitude or

primitive and unconfined recreation would be the same as those described under Alternative A.

Alternative D would result in site-specific to localized, long-term, negligible to moderate, direct, and indirect impacts on opportunities for visitors to experience naturalness and untrammeled and undeveloped wilderness, and localized, negligible to moderate, short-term, direct, and indirect impacts on opportunities for visitors to experience solitude and primitive and unconfined recreation. Restrictions in the three wilderness areas would eliminate direct and indirect impacts from recreational target shooting in these areas. Recreational target shooting in the available areas adjacent to these wilderness areas would result in indirect impacts from recreational target shooting and motor vehicles. These indirect impacts would occur in the perimeter locations of wilderness.

Overall cumulative impacts would be the same as those described under Alternative A. When the impacts from Alternative D are combined with the impacts under past, present, and reasonably foreseeable future projects, the short- and long-term, cumulative impacts on visitors' opportunities to experience wilderness qualities would be region-wide, moderate, direct, and indirect.

Under Alternative D, approximately 66 percent of the decision area would be restricted to recreational target shooting. As a result, Alternative D would have a smaller contribution to overall cumulative impacts from recreational target shooting than Alternative A.

Juan Bautista de Anza National Historic Trail

The impacts of past, present, and reasonably foreseeable future projects on the physical environment and historic setting, and on opportunities for visitors to experience the historic setting would be the same as those described under Alternative A.

The impacts on the physical environment and historic landscape setting of the NHT corridor would be the same as those described under Alternative C.

The cumulative impacts on the NHT corridor would be the same as those described under Alternative C. When the impacts from Alternative D are combined with the impacts under past, present, and reasonably foreseeable future projects, the short- and long-term, cumulative impacts on the physical environment and historic setting would be reduced from recreational target shooting and potential wildfires, and diminished opportunities for visitors to experience the historic setting from noise and visual disturbances. Alternative D would have the same contribution to overall cumulative impacts as described under Alternative C. Restrictions in the SDNM may lead to expanded and increased recreational target shooting east of the SDNM.

Alternative E

Wilderness Areas

The impacts of past, present, and reasonably foreseeable future projects on opportunities for visitors to experience naturalness and untrammeled and undeveloped wilderness, and opportunities for visitors to experience solitude or primitive and unconfined recreation would be the same as those described under Alternative A.

Alternative E would result in site-specific to localized, long-term, negligible, direct, and indirect impacts on opportunities for visitors to experience naturalness and untrammeled and undeveloped wilderness, and localized, negligible to minor, short-term, direct, and indirect impacts on opportunities for visitors to experience solitude and primitive and unconfined recreation. Restrictions in the entire planning area would eliminate direct and indirect impacts from recreational target shooting in wilderness areas.

When the impacts from Alternative E are combined with the impacts under past, present, and reasonably foreseeable future projects, the short- and long-term, cumulative impacts on visitors' opportunities to experience wilderness qualities would be region-wide, minor to moderate, direct, and indirect.

Alternative E would have the fewest contributions to overall cumulative impacts from recreational target shooting.

Juan Bautista de Anza National Historic Trail

The impacts of past, present, and reasonably foreseeable future projects on the physical environment and historic setting, and on opportunities for visitors to experience the historic setting would be the same as those described under Alternative A.

Restricting 100 percent of the decision area under Alternative E would eliminate all direct impacts and minimize indirect impacts on the NHT corridor from recreational target shooting.

The cumulative impacts on the NHT corridor would be the same as those described under Alternative D. The past, present, and reasonably foreseeable future projects would result in, direct and indirect cumulative impacts on the physical environment and historic setting. Alternative E would have the same contribution to overall cumulative impacts as described under Alternative D.

5.5 Social and Economic

5.5.1 Tribal Interests

The cumulative impacts analysis area for tribal interests is the entire SDNM and all lands within 10 miles of the SDNM boundary. This analysis area captures nearby areas popular for recreational target shooting, including Seven-Mile

Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural Gas Company pipeline road along the SDMN's northern boundary. It also includes the Buckeye Hills area that is important to the traditional trail and song-scape associated with the Komatke Trail.

It is understood that tribal interests in the SDNM and surrounding areas are part of a larger landscape that includes ancestral archaeological sites, traditional use areas, traditional trails and cultural resources, and places of religious importance that may extend beyond administrative boundaries. However, there is insufficient information to speculate on the full scope and location of such interests for multiple federally recognized tribes that claim ancestral affiliation to the SDNM and surrounding areas.

The extent and locations of tribal interests and use in the SDNM is largely unknown, but typically because of access and federal protections, much of off-reservation tribal use may occur on federally administered land. This analysis parallels that of cultural resources in **Section 5.2.2**.

The types of impacts on tribal interests that have occurred in the past are as follows:

- Physical disturbance of traditional use areas and the cultural meaning associated with these resources
- Alterations of a property's setting that make it no longer usable by tribal members
- Loss of access to places or resources, preventing exercise of access to places for traditional cultural uses and religious practices
- Loss of vegetation, topographic features, and other important landscape elements that help define special areas

Section 5.1.2 lists the past, present, and reasonably foreseeable cumulative actions within the cumulative impacts analysis area. Current and future trends are population growth, transportation and ROW development, construction associated with urban development, recreational demand, grazing, access changes, and growth in recreation. These may impact tribal interests, ancestral sites, sacred sites, or traditional use areas through loss or disturbance of resources that are not protected, changes in setting, pressure from incremental use, loss of access, and vandalism. However, the locations of important traditional cultural and religious sites, sacred sites, traditional trails and sites important to other traditional activities in the planning area are unknown to the BLM or are confidential. Further, the extent and nature of potential impacts depend on the perspective of the tribe or affected group.

Anticipated population growth and construction associated with urban development on adjacent private lands may impact tribal interests, ancestral

sites, sacred sites, or use areas through changes in access and alterations to setting, if important. Recreation demand would increase in the SDNM and increase the likelihood of impacts from physical disturbance, alterations to setting, and interference with tribal uses and interests. The SDNM Juan Bautista de Anza RMZ Recreation Plan EA (in preparation) includes consideration of impacts on tribal interests, ancestral sites, sacred sites, or traditional use areas and historic landscapes from facility development and OHV travel. Mitigation measures and ongoing consultation with tribes would be used to address anticipated increases in public recreation use, and should reduce the potential for impacts on tribal interests.

Direct and indirect impacts on tribal interests, ancestral sites, sacred sites, or traditional use areas from climate change may occur from increased wildfire, including increases in fire size, frequency, and intensity; more severe and frequent flooding and erosion; and changes in habitat distribution and water availability. Wildfire could result in direct disturbance or loss of ancestral sites, sacred sites, and/or traditional use areas by destroying or modifying those characteristics that define such places in the opinion of tribal users and practitioners. Flooding and erosion could likewise physically damage or destroy places that are important traditionally to Native Americans, or they could alter their settings.

Grazing and mining are activities that are minor contributors to current cumulative impacts on tribal interests, ancestral sites, sacred sites, or traditional use areas on or adjacent to the SDNM. Recreational target shooting is a minor to major contributor to current cumulative impacts on or adjacent to the SDNM. The specific cumulative effects of recreational target shooting are addressed in the following discussion of each alternative.

Effects Common to All Alternatives

Contributions to cumulative impacts resulting from all alternatives would be reduced through tribal consultation to determine the presence and potential for impacts on tribal interests. Laws, regulations, and BLM policies would apply to implementation of any mitigation measures that would be considered federal undertakings.

Implementing mitigation and monitoring strategies would also reduce contributions to cumulative impacts. These approaches would reduce the overall potential for impacts and could decrease the intensity of incremental impacts.

Under all alternatives, traditional use areas and objects of the SDNM with tribal cultural value would continue to be affected by natural weathering and erosion processes. Ongoing and proposed human uses may also degrade the integrity of traditional use areas. Determining impacts that may be occurring on unknown or unrecorded resources is difficult because of limited knowledge of tribal interests, traditional use areas, sacred sites, or traditional use areas.

Alternative A

Under Alternative A, all areas in the SDNM would remain available for recreational target shooting. Although recreational target shooting has generally been concentrated in particular areas, this alternative would continue to make the most land available for this activity (486,400 acres in the decision area). In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2,** this alternative would correspond with most potential for contributing to cumulative impacts on tribal interests, ancestral sites and trails, sacred sites and trails, or traditional use areas, and objects of the SDNM.

Alternative A does not provide additional protections to tribal interests, sacred sites, or traditional use areas through restriction to any areas—including those with identified sensitive resources and Monument objects. Noise and potential resource damage associated with recreational target shooting throughout the SDNM would be the cause of ongoing degradation on the integrity of tribal interests, ancestral sites, sacred sites, or traditional use areas in the SDNM.

Dispersed recreational target shooting would create noise and potentially impact cultural or important natural features on the landscape. Target materials and illegal dumping activities, loss of vegetation, and loss of qualities and values of particular landscapes can lead to degradation of the traditional use areas.

Direct impacts on the Komatke Trail, a traditional trail corridor, cannot be determined currently. No physical trail traces or features have been documented.

Indirect impact to this traditional trail corridor may be realized as damage to the features and landscape elements that this traditional trail and song-scape passes through. Areas that are used intensively for recreational target shooting may experience loss of certain vegetation types. Rock formations or small hills along the way may play a role in the recognition of this trail. Recreational target shooting and all of the associated activities and behaviors may impact the recognition of this trail corridor at some level.

Alternative B

Under Alternative B, areas in the decision area available for recreational target shooting would be reduced by 10,100 acres relative to Alternative A. Although there would be fewer acres available to this activity, the proposed restricted area has been previously disturbed by recreational target shooting. Alternative B does not provide additional protections to tribal interests, ancestral sites, sacred sites, or traditional use areas through restrictions in areas of identified sensitive resources and Monument objects.

The potential for impacts under Alternative B would be similar to Alternative A throughout most of the SDNM. However, restrictions on recreational target shooting in this area may displace this activity to other areas with road access,

such as the nearby Juan Bautista de Anza NHT RMZ or to other areas where the risk of impacts on the integrity of tribal interests, ancestral sites, sacred sites, or traditional use areas may increase. The Juan Bautista de Anza NHT RMZ is already heavily used. Trail resources and the associated site and landscape setting are considered Monument objects, and increased recreational target shooting, use, and access would increase the risk of impacts from surface disturbance, bullet strikes, vandalism, unauthorized collection, interference with tribal cultural uses, and the introduction of visual, atmospheric, or audible elements that could diminish the integrity of the setting and the feeling of the cultural landscape or to associated traditional use areas.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative B would likely result in similar potential for contributing to cumulative impacts on the integrity of tribal interests, ancestral sites, sacred sites, or traditional use areas when compared with Alternative A. Although there would be fewer acres available for this activity, recreational target shooting may be displaced to other parts of the SDNM that are more sensitive to impacts, requiring the need to implement mitigation measures. Impacts from applying mitigation measures would be similar to those described for Alternative A, but they would likely affect a smaller area under Alternative B.

Alternative C

Under Alternative C, areas in the SDNM available for recreational target shooting would be reduced by approximately 52,800 acres by restricting this activity within the Juan Bautista de Anza NHT RMZ. The RMZ contains cultural resources, historic properties and Monument objects such as the Juan Bautista de Anza NHT, the Mormon Battalion Trail, and the Butterfield Overland Stage Route. This area has the two petroglyph sites within its boundaries. The NHT also has additional management goals outlined in the NPS's CMP addressing protection for trail segments, archaeological sites, ethnographic resources, adjacent properties, research, and interpretation (NPS 1996). These restrictions would be consistent with protection criteria for Monument objects and CMP management goals for the Juan Bautista de Anza NHT.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative C would likely result in less potential for contributing to cumulative impacts on the integrity of tribal interests, ancestral sites, sacred sites, or traditional use areas when compared with Alternative A. Alternative C would provide additional protections and reduce the risks of impacts on resources and their settings. Restricting recreational target shooting in the Juan Bautista de Anza NHT RMZ could displace this activity to other areas of the SDNM, such as the Desert Back Country RMZ or the El Paso Natural Gas Company pipeline road or to locations off of the SDNM. The potential for impacts on tribal interests, ancestral sites, sacred sites,

or traditional use areas in the SDNM would be reduced overall, but potential impacts in available areas would be similar to those under Alternative A.

Alternative D

Under Alternative D, Recreational target shooting would be restricted in the Juan Bautista de Anza NHT RMZ, three designated wilderness units, and lands managed to protect wilderness characteristics, totaling approximately 319,900 acres. This includes approximately 52,800 acres in the Juan Bautista de Anza NHT RMZ, approximately 159,100 acres of designated wilderness, and approximately 108,100 acres of lands managed to protect wilderness characteristics within the SDNM. These areas are not currently popular for recreational target shooting, because of the lack of motorized vehicle access, and as a result, these areas may have a higher percentage of undisturbed areas which will have a positive effect on tribal interests, ancestral sites, sacred sites, or traditional use areas.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative D would likely result in less potential for contributing to cumulative impacts on the integrity of tribal interests, ancestral sites, sacred sites, traditional use areas, trail resources, and associated settings when compared with Alternative A. Among the additional restricted areas to recreational target shooting, culturally sensitive areas and Monument objects south of I-8 in the Table Top Wilderness and other locations throughout the SDNM would be included. Restrictions on recreational target shooting would be concentrated in the areas described above; potential impacts in the approximately 166,500 acres available to recreational target shooting would be similar to those under Alternative A.

Because 66 percent of the decision area would be restricted for recreational target shooting, there would likely be less overall recreational target shooting than under Alternative A, resulting in less need to implement mitigation measures. Impacts from applying mitigation measures would be as described for Alternative A, but they would likely affect a smaller area under Alternative D. However, Recreational target shooting activities may be displaced to areas in the Sierra Estrella, the Palo Verde Hills, and Seven Mile Mountain.

Alternative E

Under Alternative E, recreational target shooting would not be available in the SDNM. This would eliminate potential cumulative impacts on tribal interests, ancestral sites, sacred sites, or traditional use areas from this as an authorized activity. Recreational target shooting would likely continue in areas outside of the SDNM due to displacement of the activity. Under Alternative E, monitoring would ensure that the proposed restriction of recreational target shooting in the SDNM would be enforced. Since the entire SDNM would be restricted to recreational target shooting, the BLM would not likely need to implement mitigation measures.

5.5.2 Hazardous Materials and Public Safety

The cumulative impacts analysis area for hazardous materials and public safety is the SDNM and all lands within 10 miles of the SDNM boundary. This analysis area captures nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly adjacent to the El Paso Natural Gas Company pipeline road along the SDMN's northern boundary.

Effects Common to All Alternatives

Under all alternatives, there would continue to be the possibility of injury from recreational target shooting and solid waste dumping associated with recreational target shooting in the cumulative impact analysis area. These impacts would be more noticeable under alternatives where more areas are available for recreational target shooting (i.e., Alternatives A and B).

Mitigation measures would minimize impacts in the planning area, but they would not affect hazardous materials and public safety in other nearby areas popular for recreational target shooting. As a result, alternatives that result in greater displacement of target shooters to these areas would result in greater impacts on hazardous materials and public safety in these areas while simultaneously reducing impacts in the planning area.

Alternative A

Combined with implementation of Alternative A, an increasing regional population would likely result in more visitors participating in recreational target shooting and other recreational activities in the analysis area. This would increase the potential for injury from recreational target shooting and instances of solid waste dumping associated with recreational target shooting by a minor to moderate amount. Implementation of mitigation measures as described in **Appendix B** may shift impacts to other nearby areas popular with recreational target shooting.

There would continue to be a negligible to minor short- and long-term risk to human health from exposure to lead or other contaminants at informal recreational target shooting sites in and near the Monument. Levels of contamination would be expected to be higher in areas receiving more concentrated use. Risks to human health and the environment (e.g., wildlife) may increase over time as soil contaminants accumulate with continued recreational target shooting activity.

Alternative B

Cumulative impacts would be similar to those described under Alternative A, except that restricting recreational target shooting from 10,100 acres in the decision area would reduce impacts on hazardous materials and public safety in that area and increase impacts by a minor amount in other areas due to target shooter displacement.

Impacts from exposure to lead or other contaminants would be similar to those described under Alternative A, except that additional recreational target shooting in nearby areas as a result of restrictions in the Monument could increase long-term impacts outside the restricted area.

Alternative C

Cumulative impacts would be similar to those described under Alternatives A and B, except that restricting recreational target shooting from 52,800 acres in the decision area would reduce impacts on hazardous materials and public safety in that area and increase impacts by a minor to moderate amount in other areas due to target shooter displacement. Because two areas popular for recreational target shooting in the SDNM would be restricted, impacts may noticeably rise in other nearby areas, such as Seven-Mile Mountain, the Sierra Estrella, and Palo Verde Hills.

Impacts from exposure to lead or other contaminants would be similar to those described under Alternative A, except that increased recreational target shooting in nearby areas as a result of additional restrictions in the Monument could increase long-term impacts outside the restricted areas.

Alternative D

Cumulative impacts would be similar to those described under Alternative C, except there would be additional restrictions on recreational target shooting, resulting in additional target shooter displacement and shifting spatial patterns of associated impacts from recreational target shooting and solid waste dumping. The increase in intensity of impacts would be negligible, because wilderness areas and lands managed to protect wilderness characteristics are less popular for recreational target shooting.

Impacts from exposure to lead or other contaminants would be similar to those described under Alternative A, except that increases in recreational target shooting in nearby areas as a result of additional restrictions in the Monument could increase long-term impacts outside the restricted areas.

Alternative E

Restricting recreational target shooting from the entire Monument would eliminate impacts in the planning area, but it would shift those impacts to other nearby areas as described under Alternative C. There would likely be a moderate to major increase in impacts on hazardous materials and public safety in those nearby areas, because there would be much greater displacement of recreational target shooting to those areas.

Short- and long-term impacts from exposure to lead or other contaminants would only increase in recreational target shooting areas outside of the Monument because there would be no recreational target shooting in the Monument.

5.5.3 Social and Economic Conditions and Environmental Justice

The cumulative impacts analysis area for social and economic conditions and environmental justice includes Maricopa, Pima, and Pinal Counties.

Effects Common to All Alternatives

Under all alternatives, social and economic conditions in Maricopa, Pima, and Pinal Counties would continue to be impacted by trends in population growth, with increasing urban development and increasing demand for recreational activities and open space. Tourism and recreation would continue to represent important economic sectors for some communities in the area.

Target shooting opportunities in the SDNM may be limited under any of the alternatives if recreation disturbance thresholds established in the 2012 RMP are exceeded, or when dry conditions result in temporary restrictions on recreational target shooting to reduce wildfire potential. (See **Appendix B**). If such restrictions were in place, target shooters would be required to locate alternative locations, resulting in potential impacts on social and economic contributions from this activity.

Nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, and Palo Verde Hills, would continue to provide desirable opportunities for visitors seeking a dispersed recreational target shooting experience and reduce the social and economic impacts of restrictions on recreational target shooting in the planning area.

Issues impacting social and economic conditions for low income or minority populations would be the same as discussed above. Under all Alternatives, negligible contributions to environmental justice impacts would occur. No minority or low income populations have been identified at the County level based on CEQ standards. Impacts on Native American tribes' ability to access places and resources of traditional or cultural importance is discussed under each alternative below and in **Section 5.5.1**, Tribal Interests.

Alternative A

Managing the entire SDNM as available for recreational target shooting would maintain current conditions and result in continued minor contributions to cumulative social and economic impacts in the cumulative impacts analysis area. Mitigation measures may result in additional restrictions on recreational target shooting. The intensity of the impact would depend on the type, extent, and duration of mitigation measures. The contribution to cumulative impacts could be minimized due to the presence of other nearby recreational target shooting areas; however, if recreational target shooting is restricted in popular areas in the SDNM, it could lead to crowding at nearby dispersed recreational target shooting areas and result in potential decreased satisfaction with the recreational experience and decreased economic contributions from this activity.

Restrictions on recreational target shooting would likely enhance recreational experiences for other recreational users and increase the indirect cumulative social and economic contributions from other recreational activities.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2,** this alternative would correspond with most potential for contributing to cumulative impacts on impacts on tribes' ability to access places and resources of traditional or cultural importance.

Alternative B

Combined with past, present, and reasonably foreseeable future actions, Alternative B would result in minor contributions to cumulative social and economic impacts. Restrictions on recreational target shooting in a more popular recreational target shooting area in the SDNM would result in displacement of target shooters to other areas. In the long term, alternative recreational target shooting locations could become overcrowded, which could result in some target shooters decreasing recreational target shooting days and thus decreasing related economic impacts. Monitoring and mitigation measures that temporarily or permanently restrict areas to recreational target shooting would further reduce opportunities for recreational target shooting in the SDNM and may force target shooters to go elsewhere. The intensity of the impacts would depend upon the location of the restricted areas and the duration of the restriction. Restrictions on recreational target shooting would likely enhance the recreational experience and cumulative social and economic contributions from other recreational activities, as discussed under Alternative A, but to a greater degree due to additional restrictions on recreational target shooting.

The potential for impacts on tribes' ability to access places and resources of traditional or cultural importance under Alternative B would be similar to Alternative A throughout most of the SDNM. However, restrictions on recreational target shooting in this area may displace this activity to other areas with road access, such as the nearby Juan Bautista de Anza NHT RMZ or to other areas where the risk of impacts may increase.

Alternative C

Under Alternative C, restricting the Juan Bautista de Anza NHT RMZ to recreational target shooting would result in minor cumulative contributions to social and economic impacts from recreational target shooting. Impacts would be minimized due to restrictions occurring outside of the most popular recreational target shooting areas. As under Alternative A, combined with past, present, and reasonably foreseeable future actions and mitigation measures that temporarily or permanently restrict recreational target shooting would result in minor cumulative impacts on recreational target shooting opportunities. The extent and duration of any cumulative impact would depend on the location and size of the restricted area and whether the restriction would be temporary or

permanent. Restrictions on recreational target shooting would likely enhance the recreational experience and cumulative social and economic contributions from other recreational activities, as discussed under Alternative A.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative C would likely result in less potential for contributing to cumulative impacts on tribes' ability to access places and resources of traditional or cultural importance when compared with Alternative A. Alternative C would provide additional protections and reduce the risks of impacts on resources and their settings. Restricting recreational target shooting in the Juan Bautista de Anza NHT RMZ could displace this activity to other areas of the SDNM, such as the Desert Back Country RMZ or the El Paso Natural Gas Company pipeline road or to locations off of the SDNM.

Alternative D

Contributions to cumulative social and economic impacts under Alternative D would be similar to Alternative C due to restrictions on recreational target shooting occurring primarily outside of popular recreational target shooting areas. The increase in areas restricted to recreational target shooting could result in fewer interference or social value-based conflicts with other recreational users and therefore result in likely enhancement of recreational experiences for other users and related social and economic contributions. The potential for cumulative impacts from mitigation measures would be the same as those described under Alternative C.

In combination with the past, present, and reasonably foreseeable projects described in **Section 5.1.2**, Alternative D would likely result in less potential for contributing to cumulative impacts on tribes' ability to access places and resources of traditional or cultural importance when compared with Alternative A. Among the additional restricted areas to recreational target shooting, culturally sensitive areas and Monument objects south of I-8 in the Table Top Wilderness and other locations throughout the SDNM would be included.

Alternative E

Alternative E would result in minor contributions to cumulative social and economic impacts by restricting all recreational target shooting opportunities in the SDNM. Most target shooters would move to other nearby areas popular for recreational target shooting, including Seven-Mile Mountain, the Sierra Estrella, the Palo Verde Hills, and the area directly north of El Paso Natural Gas Company pipeline road. There would be more crowding at these locations than under any other alternative, because more target shooters would be displaced. Over the long term, congestion and increased travel distance may cause target shooters to stop engaging in this activity. As a result, social and economic impacts from this activity could be decreased in the three-county area. However, restrictions on recreational target shooting throughout the planning area could also reduce conflicts with other recreational uses, supporting

increased use and social and economic contributions from recreational target shooting could decrease in the alternative.

Under Alternative E, recreational target shooting would not be available in the SDNM. This would eliminate potential cumulative impacts on tribes' ability to access places and resources of traditional or cultural importance from recreational target shooting. Recreational target shooting and associated impacts would likely continue in areas outside of the SDNM due to displacement of the activity.

Chapter 6

TABLE OF CONTENTS

Chapter Page

6. CONSULTATION AND COORDINATION 6-1

6.1 Introduction 6-1
6.2 Public Collaboration and Outreach 6-1
6.2.1 Scoping Process 6-2
6.2.2 Alternatives Development Process 6-5
6.2.3 Project Website 6-5
6.2.4 Mailing List 6-6
6.2.5 Future Public Involvement 6-6
6.3 Consultation and Coordination 6-6
6.3.1 Native American Tribe Consultation 6-6
6.3.2 Arizona State Historic Preservation Office Consultation 6-7
6.3.3 US Fish and Wildlife Service Consultation 6-7
6.3.4 Resource Advisory Council Collaboration 6-8
6.3.5 Interest Groups 6-8
6.4 List of Preparers 6-8

TABLES

Page

6-1 Public Scoping Meetings 6-5

This page intentionally left blank.

CHAPTER 6
CONSULTATION AND COORDINATION

6.1 INTRODUCTION

This chapter describes the public outreach and participation opportunities associated with this RMPA/EIS, including consulting and coordinating with tribes, government agencies, and other stakeholders. The BLM conducts land use planning in accordance with FLPMA, NEPA requirements, CEQ regulations, and DOI and BLM policies and procedures implementing NEPA. NEPA and associated laws, regulations, and policies require the BLM to seek public involvement early in and throughout the planning process. This is to develop a reasonable range of alternatives to proposed actions and to prepare environmental documents that disclose the potential impacts of proposed actions and alternatives.

The BLM involved the public and other agencies by way of *Federal Register* notices, public and informal meetings, individual contacts, media releases, planning newsletters, and the SDNM RMPA website. This involvement was at the heart of the planning process leading to this RMPA/EIS.

6.2 PUBLIC COLLABORATION AND OUTREACH

Public involvement is a vital and legal component of the RMPA/EIS process. Public involvement vests the public in the decision-making process and allows for full environmental disclosure. Guidance for implementing public involvement under NEPA is codified in 40 CFR, Subpart 1506.6, thereby ensuring that federal agencies make a diligent effort to involve the public in the NEPA process. Section 202 of the FLPMA directs the Secretary of the Interior to establish procedures for public involvement during land use planning actions on public lands. These procedures can be found in the BLM's Land Use Planning Handbook H-1601-1 (BLM 2005).

The BLM involved the public in the SDNM RMPA/EIS during the following phases:

- Public scoping before NEPA analysis in order to determine the scope of issues and alternatives to be addressed in the RMPA/EIS
- Public involvement during development of alternatives to be considered in the RMPA/EIS
- Collaboration with federal, state, local, and tribal governments; the BLM Arizona Resource Advisory Council; and cooperating agencies
- Public review of and comment on the Draft RMPA/EIS, which analyzes likely environmental effects

The public scoping phase has been completed and is described below; the public outreach and collaboration phases are ongoing throughout the RMPA/EIS process. The public can obtain information about the process at any time by accessing the SDNM RMPA website (http://1.usa.gov/1ZPyFSA).

6.2.1 Scoping Process

Scoping is required by NEPA in the early stages of developing an EIS to identify issues and concerns to be addressed in the new RMPA. The process is summarized below, with greater detail provided in the Plan Amendment Scoping Report available on the project website (http://1.usa.gov/1ZPyFSA).

The BLM has provided numerous opportunities to the public; various groups; other federal agencies, such as the NPS; Native American tribal governments and members; and state and local governments to participate meaningfully and substantively and to give input and comments to the BLM during the preparation of the SDNM RMPA/EIS.

Early in the planning process, the public was invited to identify planning issues and concerns for managing BLM-administered lands, resources, and uses in the planning area. A planning issue is a significant controversy or dispute regarding management of resources or uses on BLM-administered lands that can be addressed in a variety of ways, which is within the BLM's authority to resolve.

Public Notification

Notice of Intent

The formal public scoping process for the SDNM RMPA began with the publication of the NOI in the *Federal Register* on January 21, 2016 (81 *Federal Register* 3463); the BLM also posted the NOI on the project website (http://1.usa.gov/1ZPyFSA). It served to notify the public of the BLM's intent to develop an RMPA for the SDNM planning area and identified the preliminary issues to be considered in the RMPA process. The initial scoping period was 60 days for development of alternatives and preparation of the Draft EIS.

Project Website
The BLM maintains an interactive website to provide the public with the latest information about the RMPA/EIS process; refer to **Section 6.2.3**, Project Website.

Congressional
The Monument falls in both Representatives Raul Grijalva and Kyrsten Sinema's Congressional districts. Personal calls were placed to their offices, as well as those of Senators John McCain and Jeff Flake.

State Government
The BLM Arizona State Director called the Arizona Game & Fish Director.

Arizona Resource Advisory Council (RAC)
The BLM Arizona State Director called the RAC Chairman and requested assistance in ensuring their represented interests receive factual information about the project.

Key Stakeholders
The BLM Arizona reached out to Tread Lightly!; the US Forest Service; Federal Lands Hunting, Fishing and Shooting Sports Roundtable; the WHHCC; and other partners in the Sonoran Landscape Project to confirm they understood the BLM's next steps and to ensure their stakeholders received factual information.

Media
The BLM Arizona reached out to *E&E News*, the *Arizona Republic*, *Arizona Daily Star*, *KJZZ (Public Radio)*, local TV stations, and the *Associated Press* to provide the opportunity for interviews/backgrounders, emphasizing that the RMPA/EIS is court-ordered and highlighting the proactive work the BLM has done to form partnerships across the state in an effort to find long-term solutions to the recreational target shooting issue on public lands.

Video
The BLM Arizona updated the video that announced the recreational target shooting closure. The video was used to announce the start of public scoping and was posted to the BLM Arizona YouTube site at: https://www.youtube.com/watch?v=PNR9jwcGhig.

Social Media
Following notification of the key stakeholders listed above, the BLM Arizona posted an updated video and shared a statement on Facebook, Twitter, and other social media. The BLM also highlighted the significant education, outreach, and stewardship activities of the Sonoran Desert Project partnership (a Tread Lightly! education, outreach, and engagement initiative that promotes responsible recreational target shooting).

Press Releases

On January 22, 2016, a press release was issued notifying the public that the NOI was published and indicating the start of the public comment period. On February 2, 2016, a press release was issued announcing the times and locations of the public scoping meetings.

Notifications

The BLM mailed 910 scoping letters and emailed an additional 1,387 scoping letters to interested parties in January 2016. The postcard informed the recipients of the scoping meetings and purpose, as well as the dates and locations. Recipients included congressional representatives; state and local government officials and agencies; tribal leadership; national, state, and local organizations; local business owners; private landowners; and interested individuals. The BLM compiled the mailing list from individuals, agencies, and organizations that have participated in past BLM projects; those requesting to be on the mailing list; and those who have an interest.

Scoping and Education Meetings

Following publication of the NOI for the SDNM RMPA/EIS, the BLM hosted three scooping open houses in the vicinity of the planning area in February 2016, as follows:

February 24th from 5:30pm – 9:30pm
Arizona Game & Fish Department
5000 West Carefree Highway
Phoenix, Arizona 85086

February 25th from 4:00pm – 8:00pm
Gila Bend Community Center
202 North Euclid Avenue
Gila Bend, Arizona 85337

February 26th from 4:00pm – 8:00pm
Estrella Mountain Regional Park
14805 West Vineyard Avenue
Goodyear, Arizona 85338

At the meetings, the NOI was provided for public consideration, and the open houses provide information to the public and agencies (**Table 6-1**, Public Scoping Meetings). The format of the scoping meetings was informal, one-on-one discussions between BLM representatives and members of the public. The meeting attendees were invited to submit comments and share issues and concerns related to the RMPA.

Table 6-1
Public Scoping Meetings

Date (2016)	Location (Arizona)	Attendees
February 24	Phoenix	62
February 25	Gila Bend	15
February 26	Goodyear	24

Scoping Comments Received

The BLM received a total of 376 scoping comment letters during the public scoping period (January 21 to March 21, 2016). Of these, 235 were submitted electronically via email, and 10 were submitted electronically via the BLM's ePlanning system. In addition, 29 were submitted on BLM comment forms at the public information meetings held in February 2016, 10 were mailed letters, and 2 were received via fax. Detailed information about the comments received and about the public outreach process can be found in the SDNM RMPA Scoping Report (BLM 2016). The issues identified during public scoping and outreach helped refine the list of planning issues, which guided the development of alternatives management strategies for the RMPA. Please see **Section 1.5.3**, Planning Issues, for additional discussion of the planning issues that were identified via public scoping.

6.2.2 Alternatives Development Process

After the scoping period, the BLM solicited additional public involvement to engage the public in developing possible management actions, allowable uses, and strategies (i.e., alternatives) for the RMPA.

The BLM hosted a socioeconomic workshop on August 12, 2016. Local communities; state, county, city, and tribal communities; and Resource Advisory Council members were invited via certified letters. Members of the public were notified via press release email and social media. The presentation from the workshop is available on the RMPA website.

A public open house was held on October 4, 2016, to present the preliminary alternatives developed for the Draft RMPA/EIS. The open house was held at the Burton Barr Library in downtown Phoenix from 6-8 pm. A total of 16 members of the public attended the open house.

The BLM also solicited input from cooperating agencies on the range of alternatives and associated rationales.

6.2.3 Project Website

The BLM maintains an interactive website to provide the public with the latest information about the RMPA/EIS process: http://1.usa.gov/1ZPyFSA. It provides background information about the project, an RMPA timeline, planning area maps, public meeting materials, contact information, and copies of public

information documents. The site also provided a link to the comment forms for submitting scoping comments during the public scoping process.

6.2.4 Mailing List

The Lower Sonoran Field Office mailing list is comprised of nearly 500 individuals, agencies, and organizations that have participated in past BLM projects. Attendees at all public meetings, including the public scoping meetings and socioeconomic workshops, were added to the mailing list if they wanted to receive or continue to receive project information. In addition, all individuals or organizations who submitted scoping comments were added to the mailing list. Requests to be added to or to remain on the official mailing list will continue to be accepted throughout the planning process.

6.2.5 Future Public Involvement

Public participation will be ongoing throughout the remainder of the RMPA/EIS process. One substantial part of the process is providing an opportunity for the public to comment on this Draft RMPA/EIS during a 90-day comment period. In the Proposed RMPA/Final EIS, the BLM will respond to all substantive comments received during the 90-day comment period. The BLM will issue the Record of Decision after the release of the Proposed RMPA/Final EIS, the Governor's Consistency Review, and any resolution of protests received on the Proposed RMPA/Final EIS.

6.3 Consultation and Coordination

Federal laws require the BLM to consult with certain federal and state agencies and entities and Native American tribes during the NEPA decision-making process (40 CFR, Subpart 1502.25). The BLM is also directed to integrate NEPA requirements with other environmental review and consultation requirements to reduce paperwork and delays (40 CFR, Subparts 1500.4-5).

The BLM has implemented an extensive collaborative outreach and public involvement process that has included coordinating with tribes and cooperating agencies and is working closely with the BLM Arizona Resource Advisory Council. The BLM will continue to meet with interested agencies and organizations throughout the planning process, as appropriate, and will continue coordinating closely with cooperating partners. Cooperating agencies are discussed in **Section 1.4.1**, Cooperating Agencies and Consulting Parties.

6.3.1 Native American Tribe Consultation

Federally recognized Native American tribes have a unique legal and political relationship with the government of the United States. EO 13175 requires federal agencies to coordinate and consult on a government-to-government basis with Sovereign Native American tribal governments whose interests may be directly and substantially affected by activities on government-administered lands. Other laws, regulations, guidance, and EOs require government agencies to consult with Native American people. The purpose is to identify cultural values, religious beliefs, traditional practices, and legal rights that could be

affected by BLM actions on federal lands. These legal instruments include the NHPA of 1966 (as amended); the American Indian Religious Freedom Act of 1978; the Native American Graves Protection and Repatriation Act; the DOI Secretarial Order No. 3215, 512 Department Manual Chapter 2, and BLM Manual H-8160-1; and EO 13007, Indian Sacred Sites.

Government-to-government consultation began in March 2016, when the BLM sent initial consultation letters and cooperating agency invitations to five tribes: Ak-Chin Indian Community, Hopi Tribe, Salt River Indian Community, Gila River Indian Community, and Tohono O'odham Nation.

On April 22, 2016, BLM personnel attended the Four Southern Tribes Cultural Resources Working Group Meeting held in the Florence Village, Gu Achi District of the Tohono O'odham Nation. Tribal members provided feedback on the importance of the Monument and the issue of recreational target shooting.

The Ak-Chin Indian Community is a cooperating agency in this RMPA. Government-to-government consultation will continue throughout the RMPA process to ensure that the concerns of tribal groups are considered in RMPA development.

6.3.2 Arizona State Historic Preservation Office Consultation

The SHPO was notified of the status of the RMPA/EIS on February 16, 2016, via certified mail, and had in-person meetings with the BLM on April 14 and October 28, 2016, to discuss the project in depth. The BLM is developing a compliance document that will address issues related to Section 106 consultation. Specifically, the compliance document will include Class I documentation of previously performed cultural resources surveys and a list of known, recorded sites; results of additional field surveys that will verify the presence or absence of cultural sites in or near some of the most heavily used target shooting sites on the SDNM; and a commitment to continue to work with Native American tribes to identify sacred areas, ceremonial areas, and/or areas where certain plants are gathered, especially those areas near target shooting sites. This information will be used to compile a finding of effect, which will also be included in the compliance document. Monitoring and mitigation, as outlined in Appendix B, would include continued implementation of avoidance measures to prevent impacts on cultural resources. Additional information on SHPO consultation will be added to the Proposed RMPA/Final EIS.

6.3.3 US Fish and Wildlife Service Consultation

To initiate compliance with Section 7(c) of the Endangered Species Act, a species list was requested early in the process, and a description of the RMPA/EIS was provided to the USFWS. The BLM will consult with the USFWS to identify Endangered Species Act issues and to develop the draft biological assessment.

6.3.4 Resource Advisory Council Collaboration

A Resource Advisory Council is a committee established by the Secretary of the Interior to provide advice or recommendations to BLM management (BLM Land Use Planning Handbook H-1601-1; BLM 2005). The Resource Advisory Council is generally composed of 15 members of the public, representing different areas of expertise. As provided for by FLPMA, the DOI established the Resource Advisory Council program in 1995 as a forum for local citizens to provide the DOI with advice and recommendations on managing public lands. The Resource Advisory Council members serve a three-year term, which is staggered among members such that one-third of the membership is subject to appointment in any given year.

The members of the Resource Advisory Council serve in an advisory capacity to develop recommendations for the BLM on preparing, amending, and implementing land use plans for the BLM-administered lands and resources under the Resource Advisory Council's jurisdiction. The Resource Advisory Council also advises the BLM on developing recommendations for implementing ecosystem management concepts, principles, and programs. Members assist the BLM in establishing landscape goals and objectives.

The BLM notified the Resource Advisory Council members of the RMPA/EIS effort and invited their participation and input at public meetings and open houses. The BLM will continue to make Resource Advisory Council members aware of upcoming public involvement opportunities.

6.3.5 Interest Groups

During the initial scoping of the project, the Federal Lands Hunting, Fishing, and Shooting Sports Roundtable was notified about the project. Notification efforts to other groups is summarized in **Section 6.2.1**. The BLM will continue to maintain its open-door policy regarding meeting with interest groups and members of the public.

6.4 List of Preparers

Name	Role/Responsibility
BLM	
Leon Thomas	District Manager
Ed Kender	Field Manager
Dave Scarbrough	Monument Manager
Wayne Monger	RMPA Project Manager
Brian Buttazoni	NEPA Coordinator; Administrative Record; ePlanning
Cheryl Blanchard	Cultural and Heritage Resources; Tribal Interests
Michael Johnson	Social and Economic Conditions/ Environmental Justice
Marcel Martinez	GIS
Dallas Meeks	Lands with Wilderness Characteristics; Recreation Management; Recreational Target Shooting; Travel Management; National Conservation Lands; Congressional Designations

Name	Role/Responsibility
Fritz Mueller	Wildfire Management
Matt Plis	Hazardous Materials and Public Safety
Ronald Tipton	Priority Wildlife Species and Habitat
Doug Whitbeck	Vegetation; Livestock Grazing
Aaron Wilkerson	Air Quality; Soil Resources; Water Resources
Environmental Management and Planning Solutions, Inc.	
Drew Vankat	Project Manager; Hazardous Materials and Public Safety
Holly Prohaska	Deputy Project Manager; Livestock Grazing
Jacob Accola	GIS
Sean Cottle	Lands with Wilderness Characteristics
Kevin Doyle	Cultural and Heritage Resources; Tribal Interests
Zoe Ghali	Social and Economic Conditions/Environmental Justice; Livestock Grazing
Peter Gower	Recreation Management; Recreational Target Shooting; Travel Management
Derek Holmgren	Soil Resources; Water Resources
Jeff Johnson	Wildfire Management
Laura Patten	Air Quality
Kevin Rice	Priority Wildlife Species and Habitat
Marcia Rickey	GIS
Chad Ricklefs	National Conservation Lands; Congressional Designations
Morgan Trieger	Vegetation
Randolph Varney	Technical Editor

This page intentionally left blank.

References

REFERENCES

Abatzoglou, J. T., and C. A. Kolden, 2011. *Climate change in western U.S. deserts: Potential for increased wildfire and invasive annual grasses.* Rangeland Ecology and Management 64(5): 471–478.

Agee, J. K. 1993. Fire ecology of Pacific Northwest Forests. Island Press. Covelo. CA.

Alford, E. J., J, H. Brock, and G. J. Gottfried. 2005. Effects of Fire on Sonoran Desert Plant Communities. USDA Forest Service Proceedings RMRS-P-36: 451-454. Forest Service, Fort Collins, Colorado.

Arita, H. T. Spatial segregation in long-nosed bats, Leptonycteris nivalis and Leponycteris curasoae, in Mexico. Journal of Mammology. 79: 706-714.

Alford, E. J., J. H. Brock, and G. J. Gottfried. 2005. Effects of Fire on Sonoran Desert Plant Communities. USDA Forest Service Proceedings RMRS-P-36: 451-454. Forest Service, Fort Collins, Colorado.

Arizona Game and Fish Department (AGFD). 2016. Arizona Environmental Online Review Tool Report. Phoenix, Arizona.

_____. 2014. Arizona Trends Regarding Wildlife. Human Dimensions Program. March 10, 2014. Phoenix, Arizona.

_____. 2003. Arizona Heritage Data Management System.

_____. 2003a. The Economic Importance of Fishing and Hunting. Prepared by Arizona State University West, Glendale, Arizona.

_____. 2003b. The Economic Importance of Off-Highway Vehicle Recreation. Prepared by Arizona State University West, Glendale, Arizona.

_____. 2003c. Economic Impact Analysis of Nonconsumptive Wildlife-Related Recreation in Arizona. Prepared by Southwick and Associates. May 2003.

_____. 2002. Sonoran pronghorn antelope. Unpublished abstracted compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 7 pp.

_____. 2001. Wildlife 2006. The Arizona Game and Fish Departments Wildlife Management Program Strategic Plan for the years 2001-2006. Approved by the AGFD Commission January 19, 2001. 91 pp. Internet Website: www.azgfd.com.

Arizona Interagency Desert Tortoise Team (AIDTT). 2015. Candidate Conservation Agreement for the Sonoran Desert Tortoise. Internet website: http://www.blm.gov/style/medialib/blm/az/pdfs/efoia/2016im_ib.Par.67740.File.dat/IMAZ-2016-004.pdf.

_____. 2000. R. C. Averill-Murray, ed. Status of the Sonoran Population of the Desert Tortoise in Arizona: An Update. Arizona Interagency Desert Tortoise Team and Arizona Game and Fish Department, Phoenix. 48pp.

_____. 1996. Management Plan for the Sonoran Desert Population of the Desert Tortoise in Arizona. Internet website: https://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/DesertTortoise/Management_Plan_Sonoran_Desert_Tortoise.PDF.

Bagne, K. E. and D. M. Finch. 2012. Vulnerability of species to climate change in the southwest: threatened, endangered, and at-risk species at the Barry M. Goldwater Range, Arizona. Gen. Tech. Rep. RMRS-GTR-284. Fort Collins, Colorado: US Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Bainbridge, D. A. 2007. *A Guide for Desert and Dryland Restoration: New Hope for Arid Lands*. Island Press, Washington, DC.

Barber, J. R., R. K. R. Crooks, and K. M. Fristrup. 2009. The costs of chronic noise exposure for terrestrial organisms. Trends in Ecology and Evolution 25:3, 180-189.

Behnke, R. J. 1979. Monograph of the Native Trouts of the Genus Salmo of Western North America. US Department of Agriculture, Forest Service, Rocky Mountain Region, Lakewood, Colorado.

Beier, P., E. Garding, and D. Majka. 2008. Arizona Missing Linkages: Gila Bend – Sierra Estrella Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University. Flagstaff, Arizona.

Belnap, J., and D. Eldridge. 2001. "Disturbance and Recovery of Biological Soil Crusts." In *Ecological Studies, Vol. 150, Biological Soil Crusts: Structure, Function, and Management* (Dr. Jayne Belnap and Dr. Otto L. Lange, editors). Springer-Verlag, Berlin and Heidelberg, Germany. Pp. 363-383.

Belnap, J., J. H. Kaltenecker, R. Rosentreter, J. Williams, S. Leonard, and D. Eldridge. 2001. Biological soil crusts: Ecology and management. Technical Reference 1730-2. US Department of the Interior, Bureau of Land Management, Denver, Colorado.

Bent, A. C. 1940. Life histories of North American Cuckoos, Goatsuckers, Hummingbirds, and their allies. US Natural Museum Bulletin. p. 176.

BLS 2016. CPI inflation calculator. Available at: http://www.bls.gov/data/inflation_calculator.htm

Bowker, M. A., J. Belnap, V. Bala Chaudhary, and N. C. Johnson. 2008. "Revisiting classic water erosion models in drylands: The strong impact of biological soil crusts." *Soil Biology and Biochemistry* 40:2309-2316. doi: 10.1016/j.soilbio.2008.05.008.

Briske, D. D., and J. H. Richards. 1995. Plant responses to defoliation: A physiological, morphological, and demographic evaluation. In: Bedunah, D. J., and R. E. Sosebee (Eds.), Wildland Plants: Physiological Ecology and Developmental Morphology. Society for Range Management, Denver, Colorado.

Brunson, M. W., and B. S. Steel. 1994. "National public attitudes towards federal rangeland managements." Rangelands 16(2):77-81.

Bureau of Land Management (BLM), US. Department of Interior (USDI) 2016. Phoenix District Office Law Enforcement Plan.

_____. 2016a. Sonoran Desert National Monument Visitor Survey. Prepared by the Social and Economic Sciences Research Center at Washington State University. Pullman, WA.

_____. 2016b. RMIS (Recreation Management Information System). 2016

_____. 2016c. Scoping Report for the Sonoran Desert National Monument Resource Management Plan Amendment and Environmental Impact Statement. April 20, 2016. Lower Sonoran Field Office, Sonoran Desert National Monument, Phoenix, Arizona.

_____. 2016d. Fire Restrictions in Effect for Public Lands near Phoenix. BLM, 2016, Fire Prevention Order No. AZ-P02-16-1, BLM-Lower Sonoran Field Office.

_____. 2016e. Sonoran Desert National Monument: Juan Bautista de Anza Recreation Management Zone Recreation Plan. Environmental Assessment No. DOI-BLM-AZ-P040-2015-0002-EA. BLM Phoenix District, Phoenix, AZ.

_____. 2015a. Socioeconomic Impacts in Arizona. Internet website: http://www.blm.gov/wo/st/en/info/socioeconomic/states/arizona.html. Last updated Nov 2, 2015.

_____. 2015b. Recreation Management Information System Data. Report generated: July 22, 2016.

_____. 2013. Arizona BLM Phoenix District Fire Management Plan. Prepared by Geomorph Information Systems, LLC., San Diego, CA.

_____. 2012. Lower Sonoran-Sonoran Desert NM Proposed RMP/Final EIS. Internet Website: https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage&currentPageId=21457.

_____. 2012a. Sonoran Desert National Monument Travel Management Plan. Supplement to the Sonoran Desert National Monument Record of Decision and Approved Resource Management Plan. Online at: https://eplanning.blm.gov/epl-front-office/projects/lup/11856/40032/41986/06-SDNM-Appendix-E-TMP_508.pdf.

_____. 2012b. Manual 6310, Conducting Wilderness Characteristics Inventory on BLM Lands. US Department of the Interior, Bureau of Land Management, Washington, DC.

_____. 2012c. Manual 6320, Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process. Rel. 6-130. BLM, Washington, DC.

_____. 2008. 6840 – Special Status Species Management Manual. Internet website: http://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.43545.File.dat/6840.pdf.

_____. 2005. Maricopa Complex Wilderness Management Plan: Five-Year Evaluation. Phoenix Field Office.

_____. 2005a. Handbook H-1601-1—Land Use Planning Handbook. BLM, Washington, DC. March 11, 2005.

_____. 2004. Arizona Strip Fire Management Zone Fire Management Plan.

_____. 2003. Arizona Statewide Land Use Plan Amendment – Fire, Fuels and Air Quality Management. Arizona State Office – Finding of No Significant Impact (FONSi) and Environmental Assessment.

_____. 2001. Status of the science: on questions that relate to BLM plan amendment decisions and peninsular ranges Bighorn Sheep. Updated March 14, 2001. Internet website: http://www.blm.gov/ca/pdfs/palmsprings_pdfs/Stat_of_Sci.pdf.

_____. 1995. Maricopa Complex Wilderness Management Plan, Environmental Assessment, and Decision Record. Lower Gila Resource Area, Phoenix.

_____. 1989. Phoenix Resource Area Resource Management Plan. Phoenix District. Released in 1988, Adopted in 1989.

_____. 1988. Lower Gila South Resource Management Plan. Internet website: http://www.blm.gov/style/medialib/blm/az/pdfs/nepa/library/resource_management.Par.22305.File.dat/lower-gila-south-complete.pdf.

_____. 1988b. Rangewide plan for managing habitat of desert bighorn sheep on public lands. US Department of the Interior, Bureau of Land Management, Washington, DC. 41 pp.

_____. 1980. Wilderness Review, Arizona: Intensive Inventory of Public Lands Administered by Bureau of Land Management, Decision Report. Arizona State Office, Phoenix.

_____. 1979. Wilderness Review, Arizona: Initial Inventory of Public Lands Administered by BLM, Decision Report. Internet website: https://archive.org/stream/wildernessinitia5495unit/wildernessinitia5495unit_djvu.txt.

_____. 1974. Livestock Grazing Management on National Resource Lands. Environmental Impact Statement. Internet website: https://books.google.com/books?id=Kg8xAQAAMAAJ&pg=SL252-PA155&lpg=SL252-PA155&dq=livestock+Grazing+Management+on+National+Resource+Lands:+Environmental+Impact+Statement+grazing+air&source=bl&ots=45WPqBw2yT&sig=hiQKJj49kQOsMUw8y6_QX8BC3cM&hl=en&sa=X&ved=0ahUKEwjzqYm08p7PAhUO1mMKHXXMBrMQ6AEIMzAD#v=onepage&q=livestock%20Grazing%20Management%20on%20National%20Resource%20Lands%3A%20Environmental%20Impact%20Statement%20grazing%20air&f=false.

Bureau of Land Management (BLM), US. Department of Interior (USDI) 2016 GIS. GIS data used in the Sonoran Desert National Monument Resource Plan Amendment, including the Alternatives, Affected Environment, and Impact Analyses sections. Base GIS data on file from the BLM's Phoenix District Office GIS server and the Lower Sonoran Field Office/Sonoran Desert National Monument Environmental Impact Statement. Phoenix, Arizona. September 2016.

Brown, James K.; Smith, Jane Kapler, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.

Brown, D. E. ed. 1994. Biotic Communities: Southwestern United States and Northwestern Mexico. Salt Lake City, Utah: University of Utah Press. 342 p.

Brown, B. T. 1988. Breeding ecology of a willow flycatcher population in Grand Canyon. Arizona. Western Birds 19:25-33.

Browning, M. R. 1993. Comments on the taxonomy of Empidonax traillii (willow flycatcher). Western Birds 24:241-257.

Busch, D. E. 1995. Effects of fire on southwestern riparian plant community structure. Southwestern Nat. 40:259-276.

Cameron, R. E. 1960. Communities of soil algae occurring in the Sonoran Desert in Arizona. Journal of the Arizona Academy of Science 1:85-88.

Carothers, P. J. Vaske, and M.P. Donnelly. 2001. Social Values Versus interpersonal conflict among hikers and mountain bikers. Leisure sciences: 23. 47-61.

CBD. 2004. Petition to list the Tucson shovel-nosed snake (Chionactis occipitalis klauberi) as an endangered species. Internet web site: http://www.biologicaldiversity.org/species/reptiles/Tucson_shovel-nosed_snake/pdfs/petition.pdf.

Corman, T. 2005. Yellow-billed cuckoo. In: Arizona Breeding Bird Atlas. T. Corman and C. WiseGervais, eds. University of New Mexico Press, Albuquerque, NM. 2 pp.

Council on Environmental Quality (CEQ). 1997. Environmental Justice Guidance under the National Environmental Policy Act. December 10, 1997. Washington, DC.

DealerNews.com. 2015. Arizona Considers OHV Registration. Internet website: http://www.dealernews.com/dealernews/article/arizona-considers-ohv-registration.

DiTomaso, J. M. 2000. "Invasive weeds in rangelands: species, impacts, and management." *Weed Science* 48(2):255-265.

Dolton, D. D. and R. D. Rau. Mourning Dove Population Status, 2006. US Fish and Wildlife Service, Laurel, Maryland.

Dunne, T., D. Western, and W. E. Dietrich. 2011. Effects of cattle trampling on vegetation, infiltration, and erosion in a tropical rangeland. Journal of Arid Environments 75:58-69.

Ellis, L. M., C. S. Crawford, and M. C. Molles. 1998. Comparison of litter dynamics in native and exotic riparian vegetation along the middle Rio Grande of central New Mexico, U.S.A. Journal of Arid Environments 38:283-296.

Environmental Protection Agency (EPA). 2016. Understanding Global Warming Potentials. Internet website: https://www.epa.gov/ghgemissions/understanding-global-warming-potentials.

_____. 2015. Current Nonattainment Counties for All Criteria Pollutants. Internet website: https://www3.epa.gov/airquality/greenbook/ancl.html.

_____. 2015. Environmental Protection Agency (EPA) published GIS data of nonattainment areas. United States Environmental Protection Agency. Internet website: https://www.epa.gov/green-book/green-book-gis-download. September 2016.

_____. 1998. Illegal Dumping Prevention Guidebook. Internet website: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000CNVU.PDF?Dockey=2000CNVU.PDF.

Epps, C. W., D. R. McCullough, J. D. Wehausen, V. C. Bleich, and J. L. Rechel. 2004. *Effects of Climate Change on Population Persistence of Desert-Dwelling Mountain Sheep in California*. Conservation Biology. 18(1):102-113.

Esque, T. C., C. R. Schwalbe, L. A. DeFalco, R. B. Duncan, and T. J. Hughes. 2003. Effects of desert wildfires on desert tortoise (Gopherus agassizii) and other small vertebrates. The Southwestern Naturalist 48(1): 103-111. Referenced in USDI, BLM. 2003. Arizona Statewide Land Use Plan Amendment for Fire, Fuels and Air Quality Management. Arizona State Office. Finding of No Significant Impact (FONSI) and Environmental Assessment. September.

Federal Register. 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Arizona Distinct Population Segment of the Cactus Ferruginous Pygmy-owl (Glaucidium brasilianum cactorum). Vol. 67, No. 229. 71032-71064.

Felger, R. S., M. B. Johnson, and M. F. Wilson. 2001. Trees of Sonora, Mexico. Oxford University Press, New York.

Finney, M. A., T. B. Maynard, S. S. McAllister, and I. J. Grob. 2013. A study of ignition by rifle bullets. Res. Pap. RMRS-RP-104. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Fleming, T. H., M. D. Tuttle, and M. A. Horner. 1996. Pollination biology and the relative importance of nocturnal and diurnal pollinators of three species of Sonoran Desert cacti. Southwestern Naturalist. 41:257-269.

Fleming, T. H., R. A. Nunez, and L. S. L. Steinberg. 1993. Seasonal changes in the diets of migrant and non-migrant nectarivorous bats as revealed by carbon stable isotope analysis. Occologia 94: 72-74.

Foti, P. and N. Chambers. 2005. Sonoran Desert National Monument Recreation Impact Inventory: Final Report. Prepared for BLM-Phoenix District.

Fuentes Ramirez, A. H. 2015. Flammable deserts: understanding the impacts of fire on southwestern desert ecosystems of USA. A dissertation submitted to the graduate faculty in partial fulfillment of the requirements for the degree of Doctor of Philosophy. Iowa State University, Ames, Iowa.

Galbraith, H., K. LeJeune, and J. Lipton. 1995. Metal and Arsenic Impacts to Soils, Vegetation, Communities and Wildlife Habitat in Southwest Montana Uplands Contaminated by Smelter Emissions: I Field Evaluation. Environmental Toxicology and Chemistry 14(11):1895-1903.

Gelbard, J. L., and J. Belnap. 2003. "Roads as conduits for exotic plant invasions in a semiarid landscape." *Conservation Biology* 17(2):420-432.

Groschupf, K. 1987. Status of the yellow-billed cuckoo (Coccyzus americanus occidentalis) in Arizona and west Texas. Report prepared for the US Fish and Wildlife Service, under contract no. 20181-86- 00731. 34 pp.

Gutzwiller, K. J., H. A. Marcum, H. B. Harvey, J. D. Roth, and S. H. Anderson. 1998. Bird tolerance to human intrusion in Wyoming montane forests. Condor 100:519-527.

Haig, S. M., J. D'Elia, C. Eagles-Smith, J. Fair, J. Gervais, G. Herring, J. Rivers, and J. Schulz. 2014. The persistent problem of lead poisoning in birds from ammunition and fishing tackle. Internet website: https://www.fws.gov/cno/es/calcondor/PDF_files/2014-9-CONDOR-Orn-Applications.pdf.

Hall, J. A., P. Comer, A. Gondor, R. Marshall, and S. Weinstein. 2004. Conservation Elements of and a Biodiversity Management Framework for the Barry M. Goldwater Range, Arizona. The Nature Conservancy of Arizona. 199 + ix p. + 15 unpaginated figures.

Hall, J. A., S. Weinstein, and C. L. McIntyre. 2005. The Impacts of Livestock Grazing in the Sonoran Desert: A Literature Review and Synthesis. The Nature Conservancy in Arizona, Tucson.

Hamberg, L., M. Malmivaara-Lamsa, S. Lehvavirta, R. B. O'Hara, and D. J. Kotze. 2010. Quantifying the effects of trampling and habitat edges on forest understory vegetation--a field experiment. J. Environ. Manage. 91(9):1811-1820.

Hann W., M. Beighley, P. Teensma, T. Sexton, and M. Hilbruner. 2004. A cohesive strategy for protecting people and sustaining natural resources: Predicting outcomes for program options. Fire Fuel Treatments and Ecological Restoration Conference. Fort Collins, CO. April 16 2002.

Hann, W. J., and D. L. Bunnell. 2001. Fire and land management planning and implementation across multiple scales. Int. J. Wildland Fire. 10:389-403.

Headwater Economics. 2016. Economic Profile System Data for Pima, Maricopa, and Pinal Counties, Arizona. Files created August 3, 2016.

Heffelfinger, J. R., C. Brewer, C. H. Alcalá-Galván, B. Hale, D. L. Weybright, B. F. Wakeling, L. Carpenter, and L. Dodd. 2006. Habitat guidelines for mule deer: southwest deserts ecoregion. Mule Deer Working Group, Western Association of Fish and Wildlife Agencies.

Holechek, J. L. 2001. "Western ranching at the crossroads." Rangelands 23(1):17-21.

Hostetler, S., J. Alder, and A. Allan. 2011. Dynamically downscaled climate simulations over North America: Methods, evaluation, and supporting documentation for users. Open-File Report 2011–1238, U.S. Geological Survey, Reston, Virginia.

Hubbard, J. P. 1987. The status of the willow flycatcher in New Mexico. Endangered Species Program, New Mexico Department of Fish and Game, Santa Fe, New Mexico. 29 pp.

Hunter, M. L., Jr. 1996. Fundamentals of conservation biology. Blackwell Science, Inc., Cambridge, MA.

Innes, R. J. 2013. *Odocoileus hemionus*. In: Fire Effects Information System, [Online]. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Internet website: http://www.fs.fed.us/database/feis/animals/mammal/odhe/all.html.

Jacob, G. R. and R. Schreyer. 1980. Conflict in Outdoor Recreation-A theoretical perspective. Journal of Leisure research 12: 368-380.

Johnson, R. R., L. T. Haight, and J. M. Simpson. 1987. Endangered habitats versus endangered species: a management challenge. Western Birds 18:89-96.

Jorgensen, S. S., and M. Willems. 1987. The fate of lead in soils: The transformation of lead pellets in shooting-range soils. Ambio 16, 11-15.

Kade, A., and S. D. Warren. 2002. Soil and plant recovery after historic military disturbances in the Sonoran Desert, USA. Arid Land Research and Management 16: 231-243.

Kapustka, L. A., J. Lipton, H. Galbraith, D. Cacela, and K. Lejeune. 1995. Metal and arsenic impacts to soils, vegetation communities and wildlife habitat in southwest Montana uplands contaminated by smelter emissions: II. Laboratory phytotoxicity studies. Environmental Toxicology and Chemistry, 14: 1905–1912. doi:10.1002/etc.5620141112.

Katibah, E. F. 1984. A brief history of riparian forests in the Central Valley of California. Pages 23-29 in R.E. Warner and K.M. Hendrix eds. California Riparian Systems: Ecology, Conservation, and Productive Management. University of California Press, Berkeley, California.

Knight, R. L., and D. N. Cole. 1995. Factors That Influence Wildlife Responses to Recreationists. Pages 71-77 in R. L. Knight and K. J. Gutzwiller, editors. Wildlife and recreationists: coexistence through management and research. Island Press, Washington, DC.

Korschgen, C. E., and R. B. Dahlgren. 1992. Human disturbances of waterfowl: causes, effects, and management. Waterfowl Management Handbook. La Crosse, Wisconsin.

Lowrey, C. 2007. The impact of human disturbance on desert bighorn sheep (*Ovis Canadensis nelsoni*) in the wonderland of rocks/queen mountain region of Joshua Tree National Park, California. A final report prepared for Joshua Tree National Park, California.

Maricopa Association of Governments (MAG). 2016. Draft MAG 2017 Eight-Hour Ozone Moderate Area Plan for the Maricopa Nonattainment Area. Internet website: https://www.azmag.gov/Documents/ES_2016-09-15_MAG-2017-EightHour-Ozone-Moderate-Area-Plan_Main-Plan.pdf.

_____.2014. 2035 Regional Transportation Plan (RTP). Online at: http://www.azmag.gov/Documents/RTP_2014-01-30_Final-2035-Regional-Transportation-Plan-(RTP).pdf. Accessed September 14, 2016.

Maricopa County. 2010. Maricopa County Community Wildfire Protection Plan. Internet website: http://www.maricopa.gov/Emerg_Mgt/pdf/MCCWPP%20Public%20Review%20Draft%200223_2010.pdf.

_____. 2004. Maricopa County Regional Trail System Plan. Online at: http://www.maricopacountyparks.net/assets/1/6/MaricopaTrailMasterPlan.pdf. Accessed: September 14, 2016.

Marlow, C. B., and T. M. Pogacnik. 1985. "Time of grazing and cattle-induced damage to streambanks." Paper presented at the North American Riparian Conference. The University of Arizona, Tucson. April 15-19, 1985.

Marshall, R. M., S. Anderson, M. Batcher, P. Comer, S. Cornelius, R. Cox, A. Gondor, D. Gori, J. Humke, R. Paredes Aguilar, I. E. Parra, and S. Schwartz. 2000. An ecological analysis of conservation priorities in the Sonoran desert ecoregion. Prepared by The Nature Conservancy Arizona Chapter, Sonoran Institute, and Instituto del Medio Ambiente y el Desarrollo Sustentable del Estado de Sonora. 146 pp.

Martinez-Abrain, A., D. Oro, J. Jimenez, G. Stewart, and A. Pullin. 2010. A systematic review of the effects of recreational activities on nesting birds of prey. Basic Applied Ecology. 11:312-319.

McAuliffe, J. R. 1994. Landscape evolution, soil formation, and ecological patterns and processes in Sonoran Desert bajadas. Ecological Monographs 64: 111–148.

_____. 1995. The aftermath of wildfire in the Sonoran Desert. Sonoran Quarterly. 49: 4-8.

_____. 2000. Desert soils. Pages 87–104 in Phillips, S.J., and P. Wentworth Comus (eds.), A natural history of the Sonoran Desert. Arizona-Sonora Desert Museum, University of California Press, Berkeley, California.

McCarty, K. M. and K. V. Jacobson. 2011. Arizona golden eagle nest survey 2011 summary report. Nongame and Endangered Wildlife Program Technical Report 267. Arizona Game and Fish Department, Phoenix, Arizona.

McFadden, L. D., E. V. McDonald, S. G. Wells, K. Anderson, J. Quade, and S. L. Forman. 1998. The vesicular layer and carbonate collars of desert soils and pavements: formation, age, and relation to climate change. Geomorphology 24:101-145.

Meeuwig, R. O. 1970. Sheet Erosion on Intermountain Summer Ranges. US Forest Service Intermountain Forest and Range Experiment Station, Ogden, Utah.

Meyer, Rachelle. 2008. *Gopherus agassizii*. In: Fire Effects Information System [Online]. US Department of Agriculture, Forest Service. Internet website: http://www.fs.fed.us/database/feis/animals/reptile/goag/all.html.

Migliorini, M., G. Pigino, N. Bianchi, and F. Bernini. 2004. The effects of heavy metal contamination on the soil arthropod community of a shooting range. Environmental Pollution 129:331–340 DOI: 10.1016/j.envpol.2003.09.025.

Migliorini, M., G. Pigino, T. Caruso, P. P. Fanciulli, C. Leonzio, and F. Bernini. 2005. Soil communities (Acari Oribatida; Hexapoda Collembola) in a clay pigeon shooting range. Pedobiologia 49:1-13.

Monsen S. B., R. Stevens, and N. L. Shaw. 2004. Restoring Western Ranges and Wildlands (General Technical Report RMRS-GTR-136, Volume 1). Forest Service, Rocky Mountain Research Station. Fort Collins, Colorado. Internet website: http://www.fs.fed.us/rm/pubs/rmrs_gtr136_1.pdf.

Monson, G., and L. Sumner. 1980. The Desert Bighorn: Its Life History, Ecology and Management. The University of Arizona Press, Tucson.

Moran, K., P. Newan, and G. N. Wallace. 2007. Conflicts Associated with Recreational Shooting on the Pawnee National Grassland. Human Dimensions of Wildlife: 12:1-12. 2007.

Morgan, P.; C. C. Hardy, T. W. Swetnam, M. G. Rollins, and D. G. Long. 2001. Mapping fire regimes across time and space: understanding coarse and fine-scale fire patterns. International Journal of Wildland Fire. 10: 329–342.

National Hydrography Dataset (NHD) GIS. 2016. National Hydrography Dataset (NHD) published GIS data of surface water and watersheds. Multi-institutional cooperative effort. Internet website: nhd.usgs.gov/data.html. September 2016.

National Interagency Fuels, Fire, and Vegetation Technology Transfer. 2008.

National Oceanic and Atmospheric Administration (NOAA). 2010. 20 Questions: 2010 Update. Section I: Ozone in our Atmosphere. Internet website: http://www.esrl.noaa.gov/csd/assessments/ozone/2010/twentyquestions/Q2.pdf.

National Park Service (NPS). 1996. Juan Bautista de Anza National Historic Trail, Comprehensive Management and Use Plan and Final Environmental Impact Statement, Arizona, California. Prepared by U.S. Department of the Interior, National Park Service. Pacific West Field Area, San Francisco, California. April. Internet website: https://www.nps.gov/juba/learn/management/juba-cmp.htm.

National Research Council. 2002. Riparian Areas: Functions and Strategies for Management. National Academy Press, Washington, DC.

National Wildfire Coordinating Group (NWCG). 2012. Glossary of Wildland Fire Terminology. PMS 205. Internet website: http://www.utahfireinfo.gov/fire_information/glossary.pdf.

Neff, J. C., A. P. Ballantyne, G. L. Farmer, N. M. Mahowald, J. L. Conroy, C. C. Landry, J. T. Overpeck, T. H. Painter, C. R. Lawrence, and R. L. Reynolds. 2008. Increasing eolian dust deposition in the western United States linked to human activity. Nature Geoscience 1(3):189–195Niering, W. A., R. H. Whittaker, and C. H. Lowe. 1963. The saguaro: a population in relation to environment. Science. 142(3588):15-23.

Ohmart, R. D. and B. W. Anderson. 1982. North American desert riparian ecosystems. Pp. 433-479 in: G. L. Bender (ed.) Reference handbook on the deserts of North America. Greenwood Press, Westport, CT.

Olff, H., and M. E. Ritchie. 1998. Effects of herbivores on grassland plant diversity. TREE 13(7): 261-265.

Pagel, J. E., D. M. Whittington, and G. T. Allen. 2010. Interim Golden Eagle inventory and monitoring protocols; and other recommendations. Division of Migratory Bird Management, US Fish and Wildlife Service. Internet website: https://www.fws.gov/southwest/es/oklahoma/documents/te_species/wind%20power/usfws_interim_goea_monitoring_protocol_10march2010.pdf.

Parendes, L. A., and J. A. Jones. 2000. "Role of light availability and dispersal in exotic plant invasion along roads and streams in the H. J. Andrews Experimental Forest, Oregon." *Conservation Biology* 14:64-75.

Pavek, Diane S. 1993. Carnegiea gigantea. In: Fire Effects Information System, [Online]. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Fort Collins, Colorado.

Pacific Biodiversity Institute (PBI). 2003. Morrison, P. H., H. M. Smith IV, S. D. Snetsinger. 2003. The Natural Communities and Ecological Condition of the Sonoran Desert National Monument and Adjacent Areas. Pacific Biodiversity Institute, Winthrop, Washington. 113 + xvi p. + Vol. 2 (appendices) 395 p.

Perrow, M. R., and A. J. Davy (editors). 2003. *Handbook of Ecological Restoration: Vol. 1 Principles of Restoration.* Cambridge University Press, New York, New York.

Pierson, E. A., R. M. Turner, and J. L. Betancourt. 2013. Regional demographics trends from long-term studies of saguaro (*Carnegiea gigantea*) across the northern Sonoran Desert. Internet website: http://wwwpaztcn.wr.usgs.gov/julio_pdf/Pierson_etal_2013_JAE.pdf.

Pinal County. 2016. Draft 2015 Pinal County PM10 Exceedances. Internet website: http://www.pinalcountyaz.gov/AirQuality/Documents/Monitoring%20Network/Information/DRAFT%202015%20Pinal%20County%20PM%20Exceedances%20for%20web.pdf.

Pinal County. 2009. Pinal County Comprehensive Plan. Internet Website: http://pinalcountyaz.gov/CommunityDevelopment/Planning/Documents/CompPlan/00%20Comprehensive%20Plan%202013.pdf.

_____. 2007. Open Space and Trails Master Plan. Internet Website: http://pinalcountyaz.gov/OpenSpaceTrails/Documents/FINAL%20Open%20Space%20and%20Trails%20Master%20Plan.pdf

Pinal County, Oracle Fire District. 2009. Pinal County Community Wildfire Protection Plan. Internet website: http://www.oraclefire.org/PinalCntyCWPP-09.pdf.

Radle, A. L. 2007. Effect of Noise on Wildlife: A Literature Review. Internet website: http://wfae.net/library/articles/radle_effect_noise_wildlife.pdf.

Responsive Management. 2008. Sport Shooters' Attitudes on Shooting and Appropriate Behavior on Public Lands and the Messages to Which they will Respond. Harrisonburg, VA.

_____. 2008a, 2008b. Sport shooters' and archers' attitudes on shooting and appropriate behavior on public lands and the messages to which they will respond. Survey and Report conducted for the Federal Lands Hunting, Fishing and Shooting Sports Roundtable.

Rogers, Garry F. 1985. Mortality of burned Cereus giganteus. Ecology. 66(2): 630-631.

Rogers, G. F. and J. Steele. 1981. Sonoran Desert Fire Ecology. Proceedings of Fire History Workshop. US Forest Service General Technical Report RM-81.

Rooney, C. P. 2002. The fate of lead in soils contaminated with lead shot. A thesis submitted in partial fulfilment of the requirements for the Degree of Doctor of Philosophy, Lincoln University, Christchurch, New Zealand.

Rosgen, D. L. 1996. Applied River Morphology. Wildland Hydrology Books. Pagosa Springs, Colorado.

Rusterholz, H., M. Kissling, and B. Baur. 2009. Disturbances by human trampling alter the performance, sexual reproduction and genetic diversity in a clonal woodland herb. Perspectives in Plant Ecology, Evolution and Systematics. 11(1):17-29.

Ryan, M. G., and S. R. Archer. 2008. Land resources: Forests and arid lands: The effects of climate change on agriculture, land resources, water resources, and biodiversity in the United States. Final Report, Synthesis and Assessment Product 4.3. US Climate Change Science Program and the Subcommittee on Global Change Research, Washington, DC.

Schoenecker, K. A., and P. R. Krausman. 2002. Human disturbance in bighorn sheep habitat, Pusch Ridge Wilderness, Arizona. Journal of Arizona-Nevada Academy of Science 34(1)63-68.

Scott, Joe H., and Burgan, Robert E. 2005. Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model. Internet website: http://www.fs.fed.us/rm/pubs/rmrs_gtr153.pdf.

Sharma, P., and R. S. Dubey. 2005. Lead Toxicity in Plants. Braz. J. Plant Physiol., 17(1):35-52.

Shreve, Forrest. 1951. Sonoran Desert Subdivision Map.

Sogge, M. K., B. E. Kus, S. J. Sferra, and M. J. Whitfield. 2003. Ecology and conservation of the southwestern willow flycatcher. Studies in avian biology 26. Cooper ornithological Society, Camarillo, California. 210 pp.

Sogge, M. K. 1995a. Southwestern willow flycatcher (Empidonax traillii extimus) monitoring at Tuzigoot National Monument. 1995 progress report to the National Park Service. National Biological Service Colorado Plateau Research Station/Northern Arizona University, Flagstaff, Arizona. 20 pp

_____. 1995b. Southwestern willow flycatchers in the Grand Canyon. Pages 89-91 in LaRoe, E. T., G. S. Farris, C. E. Puckett, P. D. Doran, and M. J. Mac, eds. 1995. Our living resources: A report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems. US Department of the Interior, National Biological Service, Washington, DC. 520 pp.

Soil Conservation Service (SCS). 1991. Soil Survey for Pinal County, Arizona – Western Part. US Department of Agriculture, Soils Conservation Service (now Natural Resource Conservation Service).

_____. 1977. Soil Surveys for Maricopa County – Central Part. US Department of Agriculture (USDA), Soils Conservation Service (now Natural Resource Conservation Service). 117 p. plus maps.

_____. 1974. Soil Survey for Eastern Maricopa and Northern Pinal Counties. USDA Soils Conservation Service (now Natural Resource Conservation Service). 61 p. plus maps.

Sonoran Pronghorn Recovery Team. 2016. Quarterly meeting notes, February 2016.

Southwick Associates. 2013. Target Shooting in America. Produced for the National Shooting Sports Foundation. Internet website: http://www.nssf.org/PDF/research/TargetShootingInAmericaReport.pdf.

Stebbins, R. C. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Publishing, Boston, Massachusetts.

Steidl, R. J., and R. G. Anthony. 2000. Experimental effects of human activity on breeding bald eagles. Ecological Applications, 10(1) 258-268.

Steenbergh W. F. C. H. Lowe 1983. Ecology of the saguaro III: growth and demography. National Park Service Scientific Monograph Series No. 17. National Park Service, Washington, D.C., USA.

Strittholt, J. R., S. A. Bryce, B. C. Ward, and D. M. Bachelet. 2012. Sonoran Desert Rapid Ecoregional Assessment Report. Prepared for the US Department of the Interior, Bureau of Land Management, Denver, Colorado.

Stynes, Daniel J. and Eric M. White. 2006. Spending Profiles for National Forest Recreation Visitors by Activity. February 1, 2006. Internet website: http://www.fs.fed.us/recreation/programs/nvum/spending_profiles_2006.pdf.

SWReGAP GIS. 2004. Southwest Regional GAP Analysis Project (SWReGAP) published GIS land cover dataset. Multi-institutional cooperative effort. September 2016.

Thomas, P. A. 1991. Response of succulents to fire: a review. International Journal of Wildland Fire. 1(1): 11-22.

Tibbitts, T. J., M. K. Sogge, and S. J. Sferra. 1994. A survey protocol for the southwestern willow flycatcher (Empidonax traillii extimus). National Park Service Technical Report NPS/NAUCPRS/NRTR-94/04. 24 pp.

Trombulak, S. C., and C. A. Frissell. 2000. "Review of ecological effects of roads on terrestrial and aquatic communities." *Conservation Biology* 14:18-30.

Unitt, P. 1987. Empidonax traillii extimus: an endangered subspecies. Western Birds 18:137-162.

US Census Bureau. 2016. Quick Facts: Maricopa County, Arizona. Online at: http://www.census.gov/quickfacts/table/PST045215/04013. Accessed September 14, 2016.

_____. 2014a. Poverty Thresholds. Internet website: http://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html

_____. 2014b. American Community Survey Data. 2010-2014 5-Year Estimates. Data for Ajo, Buckeye, Gila Bend, Goodyear, Maricopa, and Phoenix, Arizona. Internet website: http://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t#

US Department of Agriculture (USDA). 2016. Soil Resources & Air Quality Affected by Wind Erosion and Fugitive Dust Emissions. Internet website: https://www.ars.usda.gov/plains-area/mhk/cgahr/spieru/docs/soil-resources-air-quality-affected-by-wind-erosion-and-fugitive-dust-emissions-1/page-1/.

US Department of Agriculture, Forest Service (USFS). 2013. A Study of Ignition by Rifle Bullets. Fort Collins, CO, Rocky Mountain Research Station.

US Department of Agriculture, Natural Resource Conservation Service (NRCS). 2016. GIS.

_____. 2011. Ecological Site Description (ESD) System for Rangeland and Forestland. Internet website: https://esis.sc.egov.usda.gov/Welcome/pgESDWelcome.aspx. Accessed August 3, 2016.

_____. 2004. Natural Resources Conservation Service (NRCS) published GIS data of soil surveys. United States Department of Agriculture. September 2016.

_____. 1997. Soil Survey for the Gila Bend–Ajo Area. USDA Natural Resource Conservation Service. 257 pp. plus maps.

_____. 1991. Soil Survey for the Gila River Indian Community, USDA, Natural Resource Conservation Service. 232 pp. plus maps.

US Departments of the Air Force, Navy, and the Interior (Lead Agency) and Arizona Game and Fish Department. 2003. Draft Environmental Impact Statement for a Proposed Integrated Natural Resources Management Plan for the Barry M. Goldwater Range.

US Department of the Interior (DOI). 2001. US DOI Bureau of Land Management and US Geological Survey, 2001. Technical Reference 1730-2, 2001, Biological Soil Crusts: Ecology and Management.

US Fish and Wildlife Service (USFWS). 2016. List of threatened and endangered species that may occur in your proposed project location, and/or be affected by your proposed project. Consultation code 02EAAZ00-2016-SLI-0642. Arizona Ecological Services Field Office. Phoenix, Arizona.

_____. 2015. Draft Recovery Plan for the Sonoran pronghorn (*Antilocapra Americana sonoriensis*), Second Revision. US Fish and Wildlife Service, Southwest Region, Albuquerque, New Mexico.

_____. 2011. National Survey of Fishing, Hunting, and Wildlife-Associated Recreation – Arizona. Internet website: https://www.census.gov/prod/2013pubs/fhw11-az.pdf.

_____. 2008. Guidelines for Raptor Conservation in the Western United States. US Fish and Wildlife Service, Region 9. Division of Migratory Bird Management, Washington, DC.

_____. 2005. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Southwestern Willow Flycatcher; Final Rule. Federal Register 70 (201): 60886-61009. October 19.

_____. 2004. Species Assessment and Listing Priority Form for Yellow-billed cuckoo, Western United States Distinct Population Segment. Internet Website: http://ecos.fws.gov/docs/candforms_pdf/r8/B06R_V01.pdf.

_____. 2003. Sonoran Pronghorn Abstract. Species Abstract Compiled and Edited by the Arizona Ecological Services Field Office, United States Fish and Wildlife Service, Phoenix, Arizona.

_____. 2003a. Cactus Ferruginous Pygmy-owl Abstract. Species Abstract Compiled and Edited by the Arizona Ecological Services Field Office, United States Fish and Wildlife Service, Phoenix, Arizona.

_____. 2002. Southwestern willow flycatcher recovery plan. Albuquerque, New Mexico. i-ix +210 pp.

_____. 2001. Endangered and Threatened Wildlife and Plants; 12-month finding for a petition to list the yellow-billed cuckoo (Coccyzus americanus) in the western continental United States. Federal Register 66(143): 38611-38626.

_____. 1997. Biological Opinion for Five Grazing Allotments in the Vicinity of Ajo, Arizona. US Fish and Wildlife Service, Region 2, Albuquerque, New Mexico.

_____. 1995. Lesser Long-nosed Bat Recovery Plan. US Fish and Wildlife Service, Albuquerque, New Mexico. 45 pp.

_____. 1993. Proposed Rule to list the Southwestern Willow Flycatcher as Endangered with Critical Habitat. Federal Register 58(40):39495-39522.

US Institute for Environmental Conflict Resolution. 2006. Final Report-Tucson Basin Shooting on Public Lands Workshop. June 2006. Tucson, AZ.

Van Devender, T. R., R. S. Felger, and A. Burquez. 1997. Exotic Plants in the Sonoran Desert Region, Arizona and Sonora. California Exotic Pest Plant Council 1997 Symposium Proceedings. California Exotic Pest Plant Council, Sonoma, California.

Vaske, J. J., M. P. Donnelly, L. K. Whittman, and S. Laidlaw. 1995. Interpersonal versus social values conflict. Leisure Sciences: 17. 205-222.

Vaske, J., M.D. Needham, R. Cline (2007) Clarifying interpersonal social values and conflict among recreationists. Journal of Leisure Research.

WAFWA (Western Association of Fish and Wildlife Agencies). 2004. North American Mule Deer Conservation Plan. Boise, Idaho.

Weis, J., and J. Overpeck. 2005. Is the Sonoran Desert losing its cool? Global Change Biology 11: 2065–2077, doi: 10.1111/j.1365-2486.2005.01020.x.

Westmoreland, D., and L. B. Best. 1985. The effect of disturbance on mourning dove nesting success. The Auk. 102: 774-780.

Whitfield, M. J. and C. M. Strong. 1995. A brown-headed cowbird control program and monitoring for the southwestern willow flycatcher, South Fork Kern River, California. California Department of Fish and Game, Bird and Mammal Conservation Program Report 95-4. Sacramento, California. 17 pp.

Wood, D. A., R. N. Fisher, and A. G. Vandergast. 2014. Frayed boundaries: color and gene flow patterns among parapatric subspecies of the Western Shovel-nosed Snake (Chionactis occipitalis). PLOS ONE 9: 1489-1507.

Wright, R. L., and J. C. deVos Jr. 1986. Final Report on Sonoran Pronghorn Status in Arizona. Arizona Game and Fish Department. Phoenix, Arizona. 132 pp

Xu, L., F. Yu, E. van Drunen, F. Schieving, M. Dong, and N. P. R. Anten. 2012. Trampling, defoliation and physiological integration affect growth, morphological and mechanical properties of a root-suckering clonal tree. Annals of Botany. 109:1001-1008.

Xu, L., S. M. A. Freitas, F. H. Yu, M. Dong, N. P. R. Anten, and M. Werger. 2013. Effects of Trampling on Morphological and Mechanical Traits of Dryland Shrub Species Do Not Depend on Water Availability. PLoS ONE 8(1): e53021. doi:10.1371/journal.pone.0053021. Internet website: http://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0053021.

Yoakum, J. D. 1978. Pronghorn. In Big game of North America: Ecology and management, edited by J. L. Schmidt and D. L. Gilbert, Pp.103-121. Stackpole Books, Harrisburg, Pennsylvania.

This page intentionally left blank.

Glossary

GLOSSARY

ACCELERATED EROSION: Soil loss above natural levels resulting directly from human activities. Because of the slow rate of soil formation, accelerated erosion can permanently reduce plant productivity.

AIR QUALITY RATING: See CLASS I AIR QUALITY RATING and CLASS II AIR QUALITY RATING.

ALLOTMENT: An area of land designated and managed for the grazing of livestock where one or more operators are authorized to graze their livestock. An allotment generally consists of federal rangelands but may include intermingled parcels of private, state, or federal lands. The BLM stipulates the number of livestock and season of use for each allotment.

ALLUVIAL FAN: A low, outspread, relatively flat to gently sloping mass of sediment, shaped like an open fan and deposited by a stream where it flows from a narrow mountain valley onto a plain or broad valley.

ALLUVIUM: Any sediment deposited by flowing water as in a riverbed, floodplain, or delta.

ANIMAL UNIT: One mature (1,000 pound) cow or the equivalent based upon an average daily forage consumption of 26 pounds of dry matter per day.

ANIMAL UNIT MONTH (AUM): The amount of forage needed to sustain one cow, five sheep, or five goats for one month.

ANNUAL PLANT: A plant that completes its life cycle and dies in one year or less.

ARCHAEOLOGICAL SITE: Any place or group of physical sites where physical remains of past human activities exist.

AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC): A designated area on public lands where special management attention is required (1) to protect and prevent irreparable damage to fish and wildlife; (2) to protect important historic, cultural, or scenic values, or other natural systems or processes; or (3) to protect life and safety from natural hazards.

ARIZONA STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR GRAZING ADMINISTRATION: Standards and guidelines developed collaboratively by BLM and the Arizona Resource Advisory Council (RAC) to address the minimum requirements of the Department of the Interior's final rule for Grazing Administration, effective Aug. 21, 1995.

AVAILABLE (RECREATIONAL TARGET SHOOTING): No restriction with respect to recreational target shooting. Anyone engaging in recreational activities within the SDNM must comply with all standard operating procedures and administrative actions described in the Recreation Management section and Appendix H of the SDNM Final EIS, as adopted in the Record of Decision, applicable laws, regulations, and policies. See RESTRICTED (RECREATIONAL TARGET SHOOTING).

BAJADA: A broad continuous slope extending along and from the base of a mountain range and formed by coalescing alluvial fans.

BASIN: A broad structural lowland between mountain ranges, commonly elongated and many miles across.

BENEFIT (RECREATION/SOCIETAL): A benefit is defined as an improved condition or the prevention of a worse condition. Benefits of leisure and recreation engagements can be realized by individuals (e.g., improved physical and psychological well-being), groups of individuals (strengthened bonds among family and friends), communities (economic gain from tourism), society (the cumulative effects of individual and group benefits), and the environment (a result of a stronger environmental ethic among individuals).

BENEFITS-BASED MANAGEMENT (RECREATION/SOCIETAL): Benefits-based management is an approach to park and recreation management that focuses on the positive outcomes of engaging in recreational experiences.

BIG GAME: Large species of wildlife that are hunted, such as elk, deer, bighorn sheep, and pronghorn.

BIGHORN SHEEP HABITAT: Area is open to non-vehicular traffic year around (e.g., hiking, biking, and equestrian). Restrictions vary by location and are listed in RMP. Typically, roads are closed during lambing season (January 1–June 30).

BIOLOGICAL DIVERSITY (BIODIVERSITY): The full range of variability within and among living organisms and the ecological complexes in which they occur. Biological diversity encompasses ecosystem or community diversity, species diversity, and genetic diversity.

BIOLOGICAL OPINION: A document that includes the following- (1) the opinion of the US Fish and Wildlife Service or the National Marine Fisheries Service as to whether a federal action is likely to jeopardize the existence of a species listed as threatened or endangered or destroy or adversely modify designated critical habitat; (2) a summary of the information on which the opinion is based; and (3) a detailed discussion of the effects of the action on listed species or designated critical habitat.

BIOLOGICAL VEGETATION TREATMENT: Methods of vegetation treatment that employ living organisms to selectively suppress, inhibit, or control herbaceous and woody vegetation. Examples of such methods include insects; pathogens; and grazing by cattle, sheep, or goats.

BIOTIC: Pertaining to life or living; the living components of the environment.

BIRDS OF CONSERVATION CONCERN: As listed by the US Fish and Wildlife Service, birds (other than threatened or endangered species) that are in greatest need of conservation action and without such action might become listed as threatened or endangered.

BOSQUE: A woodland dominated by trees more than 15 feet tall.

BROOD PARASITISM: The exploitation by one bird species of the parental behavior of another species. A nest parasite lays eggs in the nest of another bird species to be cared for by a host. The parasite benefits from saving time, energy, and survival prospects, whereas the host may suffer partial or complete loss of its own current reproduction.

BUREAU (BLM) SENSITIVE SPECIES: All species that are under status review, have small or declining populations, live in unique habitats, or need special management to reduce the likelihood and need for future listing under the ESA.

CANAMEX: Canada to Mexico highway authorized through the North American Free Trade Agreement of 1994, designed to facilitate trade between Mexico, Canada, and the US.

CANDIDATE SPECIES: Species not protected under the Endangered Species Act, but being considered by the US Fish and Wildlife Service for inclusion on the list of federally threatened and endangered species.

CANOPY: The cover or leaves of branches formed by the tops or crowns of plants as viewed from above the cover measured by the vertical projection downward of the extent of the cover and expressed as a percentage of the ground so covered.

CATTLE GUARD: A device placed in a road, usually a grate or series of metal bars placed perpendicular to the flow of traffic, which allows free passage of vehicles but which livestock will not cross.

CHANNEL: A natural or artificial watercourse with a definite bed and banks to confine and conduct continuously or periodically flowing water.

CHANNELIZATION: The process of rebuilding the natural course of a stream to make it flow into a restricted path.

CHEMICAL VEGETATION TREATMENTS: The applying of chemicals to control unwanted vegetation.

CLASS I AIR QUALITY RATING: Under the Clean Air Act, the rating given areas of the country selected to receive the most stringent degree of air quality protection.

CLASS II AIR QUALITY RATING: Under the Clean Air Act, the rating given areas of the country selected for somewhat less stringent protection from air pollution damage than Class I areas, except in specified cases.

COMMUNITY: A collective term used to describe an assemblage of organisms living together; an association of living organisms having mutual relationships among themselves and with their environment and thus functioning at least to some degree as an ecological unit.

COMPOSITION: The proportions of various plant species in relation to the total on a given area. It may be expressed in terms of cover, density, weight, etc.

COOPERATING AGENCY: Assists the lead federal agency in developing an EA or EIS. The CEQ regulations implementing NEPA define a cooperating agency as any agency that has jurisdiction by law or special expertise for proposals covered by NEPA (40 CFR 1501.6). Any federal, state, local government jurisdiction with such qualifications may become a cooperating agency by agreement with the lead agency.

COVER: (1) Plants or plant parts, living or dead, on the surface of the ground; (2) plants or objects used by wild animals for nesting, rearing of young, escape from predators, or protection from harmful environmental conditions.

CRITERIA AIR POLLUTANTS: Air pollutants for which acceptable levels of exposure can be determined and for which an ambient air quality standard

has been set. Examples of such pollutants are ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM_{10} and $PM_{2.5}$.

CRITICAL HABITAT, DESIGNATED: Specific parts of an area (1) that are occupied by a federally listed threatened or endangered plant or animal at the time it is listed and (2) that contain physical or biological features essential to the conservation of the species or that may require special management or protection. Critical habitat may also include specific areas outside an area occupied by a federally listed species if the Secretary of the Interior determines that these areas are essential for conserving the species.

CULTURAL RESOURCE: A location of human activity, occupation, or use identifiable through field inventory, historical documentation, or oral evidence. Cultural resources include archaeological and historical sites, structures, buildings, objects, artifacts, works of art, architecture, and natural features that were important in past human events. They may consist of physical remains or areas where significant human events occurred, even though evidence of the events no longer remains. And they may include definite locations of traditional, cultural, or religious importance to specified social or cultural groups.

CULTURAL RESOURCE INVENTORY (SURVEY): A descriptive listing and documentation, including photographs and maps of cultural resources. Included in an inventory are the processes of locating, identifying, and recording sites, structures, buildings, objects, and districts through library and archival research, information from persons knowledgeable about cultural resources, and on-the-ground surveys of varying intensity.

Class I: A professionally prepared study that compiles, analyzes, and synthesizes all available data on an area's cultural resources. Information sources for this study include published and unpublished documents, BLM inventory records, institutional site files, and state and National Register files. Class I inventories may have prehistoric, historic, and ethnological and sociological elements. These inventories are periodically updated to include new data from other studies and Class II and III inventories.

Class II: A professionally conducted, statistically based sample survey designed to describe the probable density, diversity, and distribution of cultural properties in a large area. This survey is achieved by projecting the results of an intensive survey carried out over limited parts of the target area. Within individual sample units, survey aims, methods, and intensities are the same as those applied in Class III inventories. To improve statistical reliability, Class II inventories may be conducted in several phases with different sample designs.

Class III: A professionally conducted intensive survey of an entire target area aimed at locating and recording all visible cultural properties. In a

Class III survey, trained observers commonly conduct systematic inspections by walking a series of close-interval parallel transects until they have thoroughly examined an area.

CULTURAL SITE: A physical location of past human activities or events, more commonly referred to as an archaeological site or a historic property. Such sites vary greatly in size and range from the location of a single cultural resource object to a cluster of cultural resource structures with associated objects and features.

CUMULATIVE IMPACTS: As stated in 40 CFR 1508.8, "...is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

DECISION RECORD: A manager's decision on a categorical exclusion review or an environmental assessment. Comparable to the record of decision for an environmental impact statement, the decision record includes- (1) a finding of no significant impact, (2) a decision to prepare an environmental impact statement, or (3) a decision not to proceed with a proposal.

DENSE: A measurable attribute of a stand. Stand density can describe how much a site is being used and the intensity of competition between saguaros for the site's resources (i.e., water, light, nutrients, space). At higher densities, the growth rates of individual Saguaros slow down because there is more competition for the site's limited resources. Additional information is provided in Section 3.2.5, Vegetation Resources.

DESERT TORTOISE HABITAT CLASSIFICATIONS: Three categories of desert tortoise habitat based on population, viability, size, density, and manageability and derived from BLM inventories of desert tortoise habitat throughout the planning areas between 1989 and 1999. The categories are as follows:

Category I. Medium to high tortoise density. Habitat area essential for maintaining large, viable populations.

Category II. Low to moderate tortoise density. Habitat is manageable.

Category III. Isolated patches of good habitat exist but are difficult to manage. Most management conflicts are not resolvable.

DESIRED OUTCOMES: A type of land use plan decision expressed as a goal or objective.

DIKE: (1) An upright or steeply dipping sheet of igneous rock that has solidified in a crack or fissure in the earth's crust; (2) a human-made structure used to control stream flow.

DISPERSED RECREATION: Recreation that does not require developed sites or facilities.

DIVERSITY (OF PLANT AND ANIMAL SPECIES): Normal variation in plant composition, variability, and abundance of native species, variety of niches, and landscape-level structural complexity.

ECOLOGICAL SITE: A distinctive kind of land that has specific physical characteristics and that differs from other kinds of land in its ability to produce a characteristic natural plant community.

ECOSYSTEM: Organisms, together with their abiotic environment, forming an interacting system and inhabiting an identifiable space.

ENDANGERED SPECIES: Any animal or plant species in danger of extinction throughout all or a significant portion of its range as designated by the US Fish and Wildlife Service under the Endangered Species Act.

ENVIRONMENTAL IMPACT STATEMENT (EIS): As per 40 CFR 1508.11 "means a detailed written statement as required by section 102 (2) (C) of the Act" (referring to the National Environmental Policy Act.)

ENVIRONMENTAL JUSTICE: The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socio-economic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and Tribal programs and policies (see Executive Order 12898).

EPHEMERAL RANGELAND: Areas of the hot desert biome (region) that do not consistently produce enough forage to sustain a livestock operation but may briefly produce unusual volumes of forage that may be utilized by livestock.

EXCAVATION: The scientific examination of an archaeological site through layer-by-layer removal and study of the contents within prescribed surface units, e.g. square meters.

EXOTIC: An organism or species that is not native to the region in which it is found.

EXTENSIVE RECREATION MANAGEMENT AREA (ERMA): A public lands unit identified in land use plans containing all acreage not identified as a SRMA. Recreation management actions within an ERMA are limited to only those of a custodial nature.

EXTIRPATED SPECIES: A locally extinct species; a species that is no longer found in a locality but exists elsewhere.

EXTIRPATION: See EXTIRPATED SPECIES.

FEDERAL LAND POLICY AND MANAGEMENT ACT (FLPMA): The act that (1) set out, for the Bureau of Land Management, standards for managing the public lands including land use planning, sales, withdrawals, acquisitions, and exchanges; (2) authorized the setting up of local advisory councils representing major citizens groups interested in land use planning and management, (3) established criteria for reviewing proposed wilderness areas, and (4) provided guidelines for other aspects of public land management such as grazing.

FINE PARTICULATE MATTER ($PM_{2.5}$): Particulate matter that is less than 2.5 microns in diameter.

FIRE MANAGEMENT: The integration of fire protection, prescribed burning, and fire ecology knowledge into multiple use planning, decision making, and land management.

FIRE MANAGEMENT PLAN: A plan that defines a program to manage wildland and prescribed fires and documents the fire management program in the approved land use plan.

FIRE SUPPRESSION: All the work of extinguishing or confining a fire, beginning with its discovery.

FIRE SUPPRESSION RESOURCES: People, equipment, services, and supplies available or potentially available for assignment to incidents.

FLOODPLAIN: Nearly level land on either or both sides of a channel that is subject to overflow flooding.

FORAGE: All browse and herbage that is available and acceptable to grazing animals or that may be harvested for feed.

FORB: An herbaceous plant that is not a grass, sedge, or rush.

FUEL LOAD (IN FIRE SUPPRESSION): The oven-dry weight of fuel per unit area usually expressed in tons/acre.

FUEL LOADING: The amount of fuel present expressed by weight of fuel per unit area.

FUEL MOISTURE CONTENT (IN FIRE SUPPRESSION): The water content of a fuel expressed as a percentage of the fuel's oven-dry weight. For dead fuels, which have no living tissue, moisture content is determined almost entirely by relative humidity, precipitation, dry-bulb temperature, and solar radiation. The moisture content of live fuels is physiologically controlled within the living plant.

FUGITIVE DUST: Dust particles that are introduced into the air through certain actions such as soil cultivation or vehicles crossing open fields or driving on dirt roads or trails.

FUNCTIONING DESERT ECOSYSTEM: Distinct mountain ranges separated by wide valleys, which include large saguaro cactus forest communities that provide excellent habitat for a wide range of wildlife species.

GENETIC DIVERSITY: The variation in genes in a population pool that contributes to the ability of organisms to evolve and adapt to new conditions.

GEOGRAPHIC INFORMATION SYSTEM (GIS): An information system that integrates, stores, edits, analyzes, shares, and displays geographic information for informing decision making.

GOAL: The desired state or condition that a resource management policy or program is designed to achieve. Broader and less specific than objectives, goals are usually not measurable and may not have specific dates by which they must be reached. Objectives are developed by first understanding one's goals.

GRADIENT: Rate of regular or graded ascent or descent.

GRAZING PERMIT/LICENSE/LEASE: A written document authorizing use of the public lands within an established grazing district. Grazing permits specify all authorized use, including livestock grazing, suspended use, and conservation use. Permits also specify the total number of AUMs apportioned, the area authorized for grazing use, or both.

GROUNDWATER: Subsurface water and underground streams that supply wells and springs. Use of groundwater in Arizona does not require a water right, but must only be "reasonable." Groundwater is separated from surface water by the type of alluvium in which the water is found. Water in the younger, floodplain alluvium is considered surface water. Water in the older, basin-fill alluvium is considered groundwater.

HABITAT: An area that provides an animal or plant with adequate food, water, shelter, and living space.

HABITAT FRAGMENTATION: Process by which habitats are increasingly subdivided into smaller units resulting in their increased insularity and losses of total habitat area.

HABITAT MANAGEMENT PLAN: A site-specific wildlife habitat plan.

HAZARDOUS MATERIALS (HAZMAT): An all-encompassing term that includes hazardous substances; hazardous waste; hazardous chemical substances; toxic substances; pollutants and contaminants; and imminently hazardous chemical substances and mixtures that can pose an unreasonable risk to human health, safety, and property.

HERBACEOUS: Of, relating to, or having the characteristics of a vascular plant that does not develop woody tissue.

HISTORICAL SITE: A location that was used or occupied after the arrival of Europeans in North America (ca. A.D. 1492). Such sites may consist of physical remains at archaeological sites or areas where significant human events occurred, even though evidence of the events no longer remains. They may have been used by people of either European or Native American descent.

HOHOKAM: A group of North American Indians who lived between perhaps 300 BC and AD 1400 in central and southern Arizona, largely along the Gila and Salt Rivers.

HOME RANGE: The area in which an animal travels in the scope of natural activities.

IMPLEMENTATION DECISIONS: Decisions that take action to implement land use plan decisions; generally appealable to IBLA under 43 CFR 4.410.

INDICATORS: Elements of the human environment affected, or potentially affected, by a change agent. An indicator can be a structural component, a functional process or an index. A key indicator integrates several system elements in such a way as to indicate the general health of that system.

INFRASTRUCTURE: The set of systems and facilities that support a region or community's social and economic structures. Examples of such systems include energy, transportation, communication, education, medical service, and fire and police protection.

INHOLDING: Parcels of land owned or managed by someone other than BLM but surrounded in part or entirely by BLM-administered land.

INTERDISCIPLINARY TEAM: A team of varied land use and resource specialists formed to provide a coordinated, integrated information base for overall land use planning and management.

INTERESTED PUBLIC: An individual, group, or organization that has submitted a written request to the authorized officer to be provided an opportunity to be involved in the decision-making process for the management of livestock grazing on specific grazing allotments or has submitted written comments to the authorized officer regarding the management of livestock grazing on a specific allotment.

INVASIVE SPECIES (INVADERS): Plant species that were either absent or present only in small amounts in undisturbed portions of a specific range site's original vegetation and invade following disturbance or continued overuse.

KEY AREA: A key area is a relatively small portion of an allotment selected because of its location, proximity to water, livestock and wildlife habitat values, and value as a long-term monitoring point.

LANDFORM: A discernible natural landscape that exists as a result of geological activity such as a plateau, plain, basin, or mountain.

LANDS MANAGED TO PROTECT WILDERNESS CHARACTERISTICS: An allocation resulting from a land use plan management decision for the purpose of protecting lands with wilderness characteristics. A wider range of actions and activities may be allowed than can occur in designated wilderness.

LAND USE ALLOCATION: The identification in a land use plan of the activities and foreseeable development that are allowed, restricted, or excluded for all or part of the planning area, based on desired future conditions.

LAND USE PLAN: A set of decisions that establish management direction for land within an administrative area as prescribed under the planning provisions of FLPMA; an assimilation of land-use-plan-level decisions developed through the planning process outlined in 43 CFR 1600, regardless of the scale at which the decisions were developed. The term includes both Resource Management Plans and Management Framework Plans.

LEASE: An authorization to possess and use public lands for a fixed period of time.

LITTER: The uppermost layer of organic debris on the soil surface, essentially freshly fallen or slightly decomposed vegetal material.

LIVESTOCK/KIND OF LIVESTOCK: The species of domestic livestock, i.e., cattle, sheep, horses, burros, and goats.

LOAM: A soil texture class for soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

MAINTENANCE (ROAD): From BLM 9100 Manual: The work required keeping a facility in such a condition that it may be continuously utilized at its original or designed capacity and efficiency, and for its intended purposes. Road or trail maintenance actions include (a) signage, (b) minor repairs, e.g. correction of drainage, erosion, or vegetation interference problems. Upon performance of condition assessment, maintenance could also be construed as (c) allowing road or trail to remain in present state for regular and continuous use.

MAJOR LAND RESOURCE AREA (MLRA): From USDA NRCS 2006: An MLRA consists of a set of geographically associated land resource units featuring a particular pattern of soils, water, climate, vegetation, land use and type of farming.

MECHANICAL VEGETATION TREATMENTS: The use of mechanical equipment to suppress, inhibit, or control herbaceous and woody vegetation. BLM uses wheeled tractors, crawler-type tractors, mowers, or specially designed vehicles with attached implements for such treatments.

MONITORING: The periodic observation and orderly collection of information to determine (1) the effects of resource management actions by tracking changing resource trends, needs, and conditions; and (2) the effectiveness of actions in meeting management objectives.

MONUMENT OBJECTS: An array of scientific, biological, archaeological, geological, cultural, and historic items and features which the Monument was created to protect.

MOSAIC: A pattern of vegetation in which two or more kinds of communities are interspersed in patches.

MOTORIZED TRAIL: A designated route that allows the use of motorcycles.

MULTIPLE USE: A combination of balanced and diverse resource uses that considers long-term needs for renewable and nonrenewable resources including recreation, wildlife, rangeland, timber, minerals, and watershed protection, along with scenic, scientific, and cultural values.

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS): The allowable concentrations of air pollutants in the ambient (public outdoor) air specified in 40 CFR 50. National ambient air quality standards are based on the air quality criteria and divided into primary standards (allowing an adequate margin of safety to protect the public health including the health of "sensitive" populations such as asthmatics, children, and the elderly) and secondary standards (allowing an adequate margin of safety to protect the public welfare). Welfare is defined as including effects on soils, water, crops, vegetation, human-made materials, animals, wildlife, weather, visibility, climate, and hazards to

transportation, as well as effects on economic values and on personal comfort and well-being.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA): The federal law, effective January 1, 1970, that established a national policy for the environment and requires federal agencies- (1) to become aware of the environmental ramifications of their proposed actions, (2) to fully disclose to the public proposed federal actions and provide a mechanism for public input to federal decision-making, and (3) to prepare environmental impact statements for every major action that would significantly affect the quality of the human environment.

NATIONAL HISTORIC PRESERVATION ACT OF 1966, AS AMENDED (NHPA): A federal statute that established a federal program to further the efforts of private agencies and individuals in preserving the Nation's historic and cultural foundations. The National Historic Preservation Act- (1) authorized the National Register of Historic Places, (2) established the Advisory Council on Historic Preservation and a National Trust Fund to administer grants for historic preservation, and (3) authorized the development of regulations to require federal agencies to consider the effects of federally assisted activities on properties included on or eligible for the National Register of Historic Places.

NATIONAL HISTORIC TRAIL: One of the three categories of national trails defined in the National Trails System Act of 1968 that can only be established by act of Congress and are administered by federal agencies, although part or all of the land base may be owned and managed by others. National historic trails are generally more than 100 miles long and follow as closely as possible and practicable the original trails or routes of travel of national historic significance. Their purpose is identifying and protecting the historic route and its remnants and artifacts for public use and enjoyment.

NATIONAL MONUMENT: An area designated to protect objects of scientific and historic interest by public proclamation of the President under the Antiquities Act of 1906, or by Congress for historic landmarks, historic and prehistoric structures, or other objects of historic or scientific interest on public lands. Designation also provides for the management of these features and values.

NATIONAL REGISTER OF HISTORIC PLACES: The official list, established by the National Historic Preservation Act, of the Nation's cultural resources worthy of preservation. The National Register lists archeological, historic, and architectural properties (i.e. districts, sites, buildings, structures, and objects) nominated for their local, state, or national significance by state and federal agencies and approved by the National Register Staff. The National Park Service maintains the National Register.

NATIVE DIVERSITY: The diversity of species that have evolved in a given place without human influence.

NATIVE SPECIES: A species that is part of an area's original flora and fauna.

NEOTROPICAL MIGRATORY BIRDS: Birds that travel to Central America, South America, the Caribbean, and Mexico during the fall to spend the winter and then return to the United States and Canada during the spring to breed. These birds include almost half of the bird species that breed in the United States and Canada.

NICHE: The role of an organism in the environment, its activities and relationships to the biotic and abiotic environment.

NITROGEN OXIDES (OXIDES OF NITROGEN, NO_2): A general term for compounds of nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen. Nitrogen oxides are typically created during combustion and are major contributors to smog formation and acid deposition. NO_2 is a criteria air pollutant and may have many adverse health effects.

NON-ATTAINMENT AREA: An area in which the level of a criteria air pollutant is higher than the level allowed by the federal standards. A single area may have acceptable levels of one criteria air pollutant but unacceptable levels of one or more other criteria air pollutants. Therefore, an area can be both attainment and nonattainment at the same time.

OBJECTIVES: The planned results to be achieved within a stated time period. Objectives are subordinate to goals, narrower in scope, and shorter in range. Objectives must specify time periods for completion, and products or achievements that are measurable. See also GOAL.

OBLIGATE: Essential, necessary, unable to exist in any other state, mode, or relationship.

OFF-HIGHWAY VEHICLE (OHV): Any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, excluding: (1) any non-amphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) any vehicle whose use is expressly authorized by the authorized officer, or otherwise officially approved; (4) vehicles in official use; and (5) any combat or combat support vehicle when used for national defense.

OFF ROAD: Cross country travel between designated routes.

OFF-ROAD VEHICLE (ORV): See OFF-HIGHWAY VEHICLE (OHV).

ON ROAD: Travelling on designated routes.

PARTICULATE MATTER: Fine liquid or solid particles suspended in the air and consisting of dust, smoke, mist, fumes, and compounds containing sulfur, nitrogen, and metals. Also see $PM_{2.5}$ PARTICULATES and PM_{10} PARTICULATES.

PERENNIAL STREAM: A stream that flows from source to mouth throughout the year; a stream that normally has water in its channel at all times.

PERMIT: A short-term revocable authorization to use public lands for specified purposes.

PERMITTEE: A person or company permitted to graze livestock or conduct commercial recreation on public land.

PM_{10} PARTICULATES: A criteria air pollutant consisting of small particles with an aerodynamic diameter of 10 microns or less. Their size allows them to enter the air sacs deep within the lungs where they may be deposited in have adverse health effects. These particles include dust, soot, and other tiny bits of solid materials in the air.

$PM_{2.5}$ PARTICULATES: Tiny particles with an aerodynamic diameter of 2.5 microns or less. These particles penetrate most deeply into the lungs.

POPULATION: A group of interbreeding organisms of the same kind occupying a particular space; a group of individuals of a species living in a certain area.

PRESCRIBED FIRE (BURNING): The planned applying of fire to rangeland vegetation and fuels under specified conditions of fuels, weather, and other variables to allow the fire to remain in a predetermined area to achieve such site-specific objectives as controlling certain plant species; enhancing growth, reproduction, or vigor of plant species; managing fuel loads; and managing vegetation community types.

PRIMITIVE RECREATION: Recreation that provides opportunities for isolation from the evidence of humans, a vastness of scale, feeling a part of the natural environment, having a high degree of challenge and risk, and using outdoor skills. Primitive recreation is characterized by meeting nature on its own terms, without comfort or convenience of facilities.

PRIMITIVE ROAD: A linear route managed for use by four-wheel drive or high-clearance vehicles. Primitive roads do not normally meet any BLM road design standards.

PRIMITIVE ROUTE: Any transportation linear feature located within areas that have been identified as having wilderness characteristics and not meeting the wilderness inventory road definition.

PRIORITY WILDLIFE SPECIES: Includes fish and wildlife species requiring protective measures and/or management guidelines to ensure their perpetuation. Moreover, priority wildlife species includes State Endangered, Threatened, Sensitive, and Candidate species; animal aggregations considered vulnerable; and those species of recreational, commercial, or tribal importance that are vulnerable.

PUBLIC LANDS: Land or interest in land owned by the United States and administered by the Secretary of the Interior through the BLM without regard to how the United States acquired ownership, except lands located on the Outer Continental Shelf, and land held for the benefit of Indians, Aleuts, and Eskimos.

RANGE IMPROVEMENT: An authorized physical modification or treatment which is designed to improve production of forage; change vegetation composition; control patterns of use; provide water; stabilize soil and water conditions; restore, protect and improve the condition of rangeland ecosystems to benefit livestock, wild horses and burros, and fish and wildlife. Range improvements may be structural or nonstructural. A structural improvement requires placement or construction to facilitate the management or control the distribution and movement of animals. Such improvements may include fences, wells, troughs, reservoirs, pipelines, and cattle guards. Nonstructural improvements consist of practices or treatments that improve resource conditions. Such improvements include seedings; chemical, mechanical, and biological plant control; prescribed burning; water spreaders; pitting; chiseling; and contour furrowing.

RANGELAND: A kind of land on which the native vegetation, climax, or natural potential consists predominately of grasses, grass like plants, forbs, or shrubs. Rangeland includes lands revegetated naturally or artificially to provide a plant cover that is managed like native vegetation. Rangelands may consist of natural grasslands, savannas, shrub lands, moist deserts, tundra, alpine communities, coastal marshes, and wet meadows.

RAPTORS: Birds of prey.

REACH (CHANNEL): A relatively homogeneous section of a stream having a repetitious sequence of physical characteristics and habitat types.

RECORD OF DECISION: A document signed by a responsible official recording a decision that was preceded by the preparing of an environmental impact statement.

RECREATIONAL TARGET SHOOTING: The discharge of any firearm for any lawful, recreational purpose other than the lawful taking of a game animal. Recreational target shooting does not include firearms use employed in accordance with state hunting regulations and policy regarding recreational

target shooting does not apply to hunters in pursuit of game with firearms that are being employed in accordance with such regulations.

RECREATION EXPERIENCES: Psychological outcomes realized either by recreation-tourism participants as a direct result of their onsite leisure engagements and recreation-tourism activity participation or by non-participating community residents as a result of their interaction with visitors and guests within their community and/or interaction with the BLM and other public and private recreation-tourism providers and their actions.

RECREATION MANAGEMENT ZONES (RMZs): Subunits within a SRMA or ERMA managed for distinctly different recreation products. Recreation products are comprised of recreation opportunities, the natural resource and community settings within which they occur, and the administrative and service environment created by all affecting recreation-tourism providers, within which recreation participation occurs.

RECREATION OPPORTUNITIES: Favorable circumstances enabling visitors' engagement in a leisure activity to realize immediate psychological experiences and attain more lasting, value-added beneficial outcomes.

RECRUITMENT: The increase in population caused by natural reproduction or immigration.

RESOURCE ADVISORY COUNCIL (RAC): A citizen-based group of 10 to 15 members chartered under the Federal Advisory Committee Act and appointed by the secretary of the interior to forward advice on public land planning and management issues to the BLM. Council membership reflects a balance of various interests concerned with the management of the public lands and users of the public lands.

RESOURCE MANAGEMENT PLAN (RMP): The Federal Land Policy and Management Act (43 CFR 1601.0-5 (k)) details the form and contents of an RMP. It generally establishes that the document will provide guidance on:

- Land areas for limited, restricted or exclusive use; designation, including ACEC designation; and transfer from Bureau of Land Management Administration;
- Allowable resource uses (either singly or in combination) and related levels of production or use to be maintained;
- Resource condition goals and objectives to be attained;
- Program constraints and general management practices needed to achieve the above items;
- Need for an area to be covered by more detailed and specific plans;

- Support action, including such measures as resource protection, access development, realty action, cadastral survey, etc., as necessary to achieve the above;
- General implementation sequences, where carrying out a planned action is dependent upon prior accomplishment of another planned action; and
- Intervals and standards for monitoring and evaluating the plan to determine the effectiveness of the plan and the need for amendment or revision.
- It is not a final implementation decision on actions which require further specific plans, process steps, or decisions under specific provisions of law and regulations.

RESTRICTED (RECREATIONAL TARGET SHOOTING): Permanently unavailable to recreational target shooting. See AVAILABLE (RECREATIONAL TARGET SHOOTING).

RESTORATION (CULTURAL RESOURCE): The process of accurately reestablishing the form and details of a property or portion of a property together with its setting, as it appeared in a particular period of time. Restoration may involve removing later work that is not in itself significant and replacing missing original work.

RIGHT-OF-WAY: A permit or easement that authorizes the use of lands for certain specified purposes, commonly for pipelines, roads, telephone lines, or power lines.

RIPARIAN: Pertaining to or situated on or along the bank of streams, lakes, and reservoirs.

RIPARIAN AREA: A form of wetland transition between permanently saturated wetlands and upland areas. Riparian areas exhibit vegetation or physical characteristics that reflect the influence of permanent surface or subsurface water. Typical riparian areas include lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels. Excluded are ephemeral streams or washes that lack vegetation and depend on free water in the soil.

ROAD (Travel Management definition): A linear route declared a road by the owner, managed for used by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use.

ROAD (Wilderness Inventory definition): A route that has been improved and maintained by mechanical means to insure relatively regular and continuous use. Refer to Manual 6310 for additional description of this definition.

ROCK CRAWLING: The use of specialized motor vehicles for crossing difficult terrain. Also known as extreme technical trail driving.

ROUTE: represents a group or set of roads, trails, and primitive roads that represents the BLM transportation system. Generically, components of the transportation system are described as "routes".

RUNOFF: Precipitation, snow melt or irrigation water that appears in uncontrolled surface streams or rivers.

SAGUARO CACTUS *(Carnegiea gigantea)*: Large, tree-like columnar cacti, found exclusively in the Sonoran Desert, that grows as a column at a very slow rate, with all growth occurring at the tip, or top of the cactus. The range of the saguaro is limited by freezing temperatures in winter and the saguaro is also limited by elevation. Although the Sonoran Desert experiences both winter and summer rains, it is thought that the Saguaro obtains most of its moisture during the summer rainy season.

SAGUARO CACTUS FOREST: Although Presidential Proclamation 7397 made frequent reference to saguaro cactus forests, no commonly accepted, exact definition of a saguaro cactus forest has been established in technical journals or by other scientific means. For the purposes of this document, a "saguaro cactus forest" refers to an area of the SDNM characterized by a vegetative cover that is visually dominated by a relatively dense stand of saguaro cactus. Such assemblages of saguaro cactus are associated with a diverse under story of desert trees and shrubs, in total comprising a complex ecological system where the general functions of a dominant over story and a variable under story are present – as in tree forests. On the SDNM, such areas of saguaro cactus forest are most common on the decomposed granitic soils of outwash plains, or "bajadas," that gently slope away from steep mountain ranges.

SAND TANK MOUNTAINS: Distinct mountain range located approximately 7 miles southeast of Gila Bend inside the Sonoran Desert National Monument and adjacent to the Barry M. Goldwater Air Force Range.

SCIENTIFIC ANALYSIS OF PLANT SPECIES AND CLIMATES: The Monument contains an abundance of packrat middens, allowing for scientific analysis of plant species and climates in past eras.

SCOPING: An early and open process for determining the scope of issues to be addressed in an environmental impact statement and the significant issues related to a proposed action.

SEASON OF USE: The time period when livestock grazing is permitted on a given range area as specified in the grazing permit.

SEDIMENT: Solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water. Sediment includes chemical and biochemical precipitates and decomposed organic material such as humus.

SEDIMENTATION: The process or action of depositing sediment.

SOIL PRODUCTIVITY: The capacity of a soil in its normal environment to produce a specified plant or sequence of plants under a specified system of management.

SOIL STABILITY: A qualitative term used to describe a soil's resistance to change. Soil stability is determined by intrinsic properties such as aspect, depth, elevation, organic matter content, parent material, slope, structure, texture, and vegetation.

SPECIAL CULTURAL RESOURCE MANAGEMENT AREA (SCRMA): An area containing cultural resources that are of special importance for public use, scientific use, traditional use or other uses as defined in BLM Manual 8110.4.

SPECIAL RECREATION MANAGEMENT AREAS (SRMAs): A public lands unit identified in land use plans to direct recreation funding and personnel to fulfill commitments made to provide specific, structured recreation opportunities (i.e., activity, experience, and benefit opportunities). Both land use plan decisions and subsequent implementing actions for recreation in each SRMA are geared to a strategically identified primary market: destination, community, or are undeveloped.

SPECIAL RECREATION PERMIT (SRP): An authorization that allows for specific nonexclusive permitted recreational uses of the public lands and related waters. SRPs are issued to control visitor use, protect recreational and natural resources, provide for the health and safety of visitors, and accommodate commercial recreational uses.

SPECIAL STATUS SPECIES: Plant or animal species listed as threatened, endangered, candidate, or sensitive by federal or state governments. By policy, the BLM has certain responsibilities for all special status species. BLM sensitive species are not covered by any other "safety net" of status designation; therefore, the Arizona BLM Sensitive Species List does not include species that are already federally listed or state listed.

STATE IMPLEMENTATION PLAN (SIP): Strategic document, prepared by a state (or other authorized air quality regulatory agency) and approved by the EPA, that thoroughly describes how requirements of the Clean Air Act will be implemented (including standards to be achieved, control measures to be applied, enforcement actions in case of violation, etc.).

STATE TRUST LANDS: Lands granted to Arizona by the federal government at territorial establishment and at statehood. Totaling 9.4 million acres, these lands are managed by the Arizona State Land Department to yield revenue over the long term for the 14 trust beneficiaries. The chief beneficiary consists of the public schools. Whenever Arizona sells or leases these lands and their natural resources, it must pay the beneficiaries. Revenues from land sales are maintained in a permanent fund managed by the State Treasurer, and interest from this fund is paid to the beneficiaries.

STIPULATION: A condition of lease or permit issuance that provides a level of protection for other resource values or land uses by restricting surface disturbing activities during certain times or locations or to avoid unacceptable impacts, to an extent greater than standard lease terms or regulations. A stipulation is an enforceable term of the lease contract or land use authorization, supersedes any inconsistent provisions of the standard lease form, and is attached to and made a part of the lease or permit. Stipulations further implement BLM's regulatory authority to protect resources or resource values. Stipulations are developed through the land use planning process.

STOCKING RATE: The number of specific kinds and classes of animals grazing or using a unit of land for a specific time period. Stocking rates may be expressed as a ratio, such as of animal units/section, acres/animal unit, or acres/animal unit month.

STRUCTURAL DIVERSITY: The diversity of the composition, abundance, spacing, and other attributes of plants in a community.

SUBSTRATE: (1) Mineral and organic material forming the bottom of a waterway or water body; (2) The base or substance upon which an organism is growing.

SURFACE-DISTURBING ACTIVITY: Surface-disturbing activities are those that normally result in more than negligible disturbance to public lands and accelerate the natural erosive process. Surface disturbance may, but does not always, require reclamation. These activities normally involve use or occupancy of the surface, cause disturbance to soils and vegetation, and are usually caused by motorized or mechanical actions. They include, but are not limited to: the use of mechanized earth-moving equipment; truck-mounted drilling and seismic exploration equipment; off-road vehicle travel in areas designated as limited or closed to off-road vehicle use; vegetation treatments; construction of facilities such as power lines, pipelines, oil and gas wells; recreation sites, improvements for range and wildlife; new road construction; and use of pyrotechnics and explosives. Surface disturbance is not normally caused by casual-use activities. Activities that are not considered surface-disturbing include, but are not limited to: livestock grazing, cross-country hiking, minimum impact filming, and vehicular travel on designated routes.

TAKE: As defined by the Endangered Species Act, "to harass, harm, pursue, hunt, shoot, wound, kill, capture, or collect, or attempt to engage in any such conduct."

TERMS AND CONDITIONS: Stipulations contained in livestock grazing permits and leases as determined by the authorized officer to be appropriate to achieve management and resource condition objectives for the public lands and other lands administered by BLM and to achieve standards for rangeland health and ensure conformance with guidelines for grazing administration.

THREATENED SPECIES: Any plant or animal species likely to become endangered within the foreseeable future throughout all or a part of its range and designated by the U.S. Fish and Wildlife Service under the Endangered Species Act. Also see ENDANGERED SPECIES.

TINAJA: A small pool in a rocky hollow, usually along an ephemeral water course where it runs through exposed bedrock that holds water into the dry season.

TRAIL: (Interagency definition) Linear route managed for human powered, stock, or off highway vehicle forms of recreation or for historic or heritage values. Trails are not generally managed for use by four wheel drive or high clearance vehicles.

Sonoran Desert National Monument Trail Definition: Linear route managed for foot, horseback, and pack stock. Motorized and mechanized forms of travel are prohibited, except for wheeled game carriers and handcarts.

Designated Wilderness Area Trail Definition: Linear route managed for travel by foot, horseback and, pack stock. Mechanized forms of travel (e.g. mountain bikes, wheeled game carriers, handcarts, and hang gliders) are prohibited in wilderness areas. Motorized travel is prohibited.

TRAILHEAD: The terminus of a hiking, horse, or bicycle trail accessible by motor vehicle and sometimes having parking, signs, a visitor register, and camping and sanitary facilities.

TRANSPORTATION SYSTEM: Represents the sum of BLM's recognized inventory of linear features (roads, primitive roads, and trails) formally recognized, designated, and approved.

TRAVEL MANAGEMENT AREAS: The TMAs are polygons or delineated areas where travel management (either motorized or non-motorized) needs particular focus. These areas may be designated as open, closed, or limited to motorized use and will typically have an identified or designated network of roads, trails, ways, and other routes that provide for public access and travel

across the planning area. All designated travel routes within TMAs should have a clearly identified need and purpose as well as clearly defined activity types, modes of travel, and seasons or times for allowable access or other limitations.

TREND: The direction of change, over time, either toward or away from desired management objectives.

UNAUTHORIZED USE: Any use of the public lands not authorized or permitted.

UPLANDS: Lands at higher elevations than the alluvial plain or low stream terrace; all lands outside the riparian-wetland and aquatic zones.

URBAN INTERFACE (WILDLAND-URBAN INTERFACE): The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetation. This interface creates conflicts and complicates fighting wildfires and conducting prescribed burns, as well as all other natural resource management activities.

VANDALISM (CULTURAL RESOURCE): Malicious damage or the unauthorized collecting, excavating, or defacing of cultural resources. Section 6 of the Archaeological Resources Protection Act states that "no person may excavate, remove, damage, or otherwise alter or deface any archaeological resource located on public lands or Indian lands…unless such activity is pursuant to a permit issued under section 4 of this Act."

VEGETATION COMMUNITIES: Plant communities that have been determined through a land use or management plan to best meets the plan's objectives for a site. A real, documented plant community that embodies the resource attributes needed for the present or potential use of an area, the desired plant community is consistent with the site's capability to produce the required resource attributes through natural succession, management intervention, or a combination of both.

VEGETATION STRUCTURE: The composition of an area's vegetation--plant species, growth forms, abundance, vegetation types, and spatial arrangement.

VEGETATION TYPE: A plant community with distinguishable characteristics.

VISITOR DAY: 12 visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more people.

WATER DEVELOPMENTS: Construction of artificial, or modification of natural water sources to provide reliable, accessible water for livestock, wildlife, or people.

WATERSHED (CATCHMENT): A topographically delineated area that is drained by a stream system, that is, the total land area above some point on a stream or river that drains water past that point. The watershed is a hydrologic unit often used as a physical-biological unit and a socioeconomic-political unit for planning and managing natural resources.

WETLANDS: An area that is inundated or saturated by surface or ground water often and long enough to support and that under normal circumstances supports a prevalence of vegetation typically adapted for life in saturated soil. Wetlands include marshes, shallows, swamps, lake shores, bogs, muskegs, wet meadows, estuaries, cienegas, and riparian areas.

WILDERNESS CHARACTERISTICS: Attributes defined in Section 2(c) of the Wilderness Act, including the area's size, its apparent naturalness, and its outstanding opportunities for solitude or a primitive and unconfined type of recreation. Wilderness characteristics may also include supplemental values such as ecological, geological, or other features of scientific, educational, scenic, or historical value that may be present but are not required.

Naturalness: The degree to which an area generally appears to have been affected primarily by the forces of nature with the imprint of people's work substantially unnoticeable.

Solitude: The state of being alone or remote from others; isolation. A lonely or secluded place.

Primitive and Unconfined Recreation: Non-motorized, non-mechanized (except as provided by law), and undeveloped types of recreation activities.

WILDFIRE: The unplanned ignition of a wildland fire (such as a fire caused by lightning, volcanoes, unauthorized and accidental human-caused fires) and escaped prescribed fires.

WILDLAND FIRE: A general term describing any non-structure fire, other than prescribed fire, that occurs in the wildland. Wildland fires are categorized into two distinct types:

Wildfires: unplanned ignitions or prescribed fires that are declared wildfires.

Prescribed Fires: Planned ignitions.

WILDLIFE: A broad term that includes birds, reptiles, amphibians, and non-domesticated mammals.

XERORIPARIAN: An area in a drainage that supports plant species more characteristic of uplands than wetlands, but that is more densely vegetated than areas removed from the drainage. Any flows in these channels are characteristically ephemeral but water may also be subsurface and the drainage may not flow.

This page intentionally left blank.

Index

Index

INDEX

Acuña cactus, 3-10, 3-27, 4-50
Air quality, 1-15, 2-20, 3-2, 3-3, 3-5, 4-6, 4-7, 4-8, 4-9, 4-38, 4-143, 5-2, 5-9, 5-10, 5-11, 5-12, 5-60, 6-9
Ak-Chin Indian Community, 1-7, 3-71, 3-84, 6-7
Arizona Game and Fish Department (AGFD), 1-7, 1-19, 3-10, 3-17, 3-79, 5-17
Arizona rosewood, 1-5, 3-30, 3-31, 3-65
Back Country, ES-8, 2-11, 3-50, 3-53, 3-62, 4-18, 4-41, 4-53, 4-62, 4-75, 4-81, 4-87, 4-88, 4-89, 4-91, 4-92, 4-96, 5-11, 5-16, 5-26, 5-30, 5-32, 5-44, 5-45, 5-47, 5-48, 5-49, 5-69
Best Management Practice (BMP), 4-37, 4-78
Bighorn sheep, 1-5, 1-10, 3-9, 3-17, 3-66, 3-68, 4-19, 4-20, 4-21, 4-22, 4-24, 4-25, 4-29, 4-31, 4-34, 5-17, 5-18, 5-19, 5-21, 5-22, 5-23
Buckeye Hills, 3-62, 5-12, 5-66
Burro, 3-2
Critical habitat, 2-24, 3-27, 3-66, 4-48, 4-50, 4-52, 4-53, 4-55, 4-56
Desert Back Country RMZ, ES-7, ES-8, 2-2, 2-11, 2-19, 2-28, 3-49, 3-50, 4-18, 4-41, 4-53, 4-62, 4-75, 4-81, 4-87, 4-88, 4-89, 4-91, 4-92, 4-96, 4-126, 5-11, 5-16, 5-26, 5-30, 5-32, 5-44, 5-45, 5-47, 5-48, 5-49, 5-69, 5-75
Desert tortoise, 1-5, 2-21, 3-9, 3-14, 3-57, 3-66, 4-19, 4-20, 4-21, 4-22, 4-23, 4-24, 4-29, 4-31, 4-33, 5-19, 5-21, 5-22, 5-23
Endangered species, 1-15, 1-19, 3-13, 5-6, 6-7
Endangered Species Act (ESA), 1-15, 1-19, 3-8, 3-9, 3-11, 3-13, 3-27, 6-7
Environmental justice, 2-38, 3-80, 4-131, 4-132, 4-133, 5-73
Equestrian, 1-5, 2-3, 3-50, 3-62, 4-99, 4-100, 5-58
Extensive Recreation Management Area (ERMA), 2-1, 2-29, 2-30, 2-29, 3-49, 3-50, 3-51, 3-53, 4-84, 4-85, 4-86, 4-89, 4-90, 4-92, 4-93, 5-45, 5-47, 5-48, 5-49, 5-50
Federal Land Policy and Management Act (FLPMA), ES-1, ES-6, 1-1, 1-2, 1-15, 1-18, 1-20, 1-22, 2-6, 3-33, 3-43, 4-1, 6-1, 6-8
Federal Mineral Estate, 1-3
Fire Regime Condition Class (FRCC), 3-37, 3-38, 3-39, 3-41, 4-72
Fire, prescribed, 3-38
Fire, suppression, 2-28, 2-27, 3-36, 3-37, 3-38, 3-42, 4-48, 4-71, 4-73, 4-74, 4-75, 4-76, 4-107, 4-114, 4-116, 5-36, 5-37, 5-38, 5-39, 5-40, 5-41, 5-42
Fuel load, 4-47, 5-37, 5-38, 5-39
Fugitive dust, 2-20, 3-3, 3-5, 4-6, 4-7, 4-8, 5-6, 5-9, 5-11
Gila River Indian Community, 1-7, 3-18, 3-71, 3-72, 3-84, 6-7
Grazing allotment, 3-20, 3-22, 3-44, 4-77, 4-78, 4-80, 5-8, 5-31
Grazing, allotment, 3-20, 3-22, 3-43, 3-44, 3-46, 4-77, 4-78, 4-79, 4-80, 4-81, 4-82, 4-83
Grazing, management, 3-44
Hazardous materials, 3-72, 3-73, 3-74, 4-14, 4-123, 4-127, 5-35, 5-36, 5-38, 5-71, 5-72
Hopi Tribe, 1-7, 3-71, 3-72, 3-84, 6-7
Juan Bautista de Anza NHT, ES-7, ES-8, 2-2, 2-11, 2-14, 2-15, 2-19, 2-20, 2-21, 2-30, 2-29, 2-30, 2-31, 2-33, 2-35, 2-34, 2-35, 3-7, 3-49,

3-50, 3-52, 3-57, 3-62, 3-66, 3-67, 3-68, 3-69, 4-11, 4-14, 4-16, 4-17, 4-18, 4-41, 4-42, 4-54, 4-62, 4-63, 4-81, 4-85, 4-86, 4-88, 4-89, 4-90, 4-91, 4-92, 4-93, 4-96, 4-97, 4-99, 4-101, 4-102, 4-103, 4-104, 4-107, 4-109, 4-112, 4-115, 4-122, 4-125, 4-126, 4-129, 4-130, 4-139, 4-140, 4-141, 5-12, 5-14, 5-15, 5-16, 5-22, 5-23, 5-26, 5-30, 5-32, 5-35, 5-44, 5-45, 5-47, 5-48, 5-49, 5-50, 5-51, 5-52, 5-53, 5-57, 5-62, 5-69, 5-70, 5-74, 5-75
Juan Bautista de Anza NHT RMZ, ES-7, 2-2, 2-11, 2-14, 2-15, 2-19, 2-29, 2-30, 2-31, 2-33, 2-35, 2-34, 2-35, 3-50, 3-52, 3-62, 4-17, 4-18, 4-41, 4-42, 4-54, 4-62, 4-63, 4-81, 4-85, 4-86, 4-88, 4-89, 4-90, 4-91, 4-92, 4-93, 4-96, 4-97, 4-99, 4-101, 4-102, 4-115, 4-125, 4-126, 4-129, 4-130, 4-139, 4-140, 4-141, 5-12, 5-15, 5-16, 5-22, 5-23, 5-26, 5-30, 5-32, 5-35, 5-44, 5-45, 5-47, 5-48, 5-49, 5-50, 5-51, 5-52, 5-53, 5-62, 5-69, 5-70, 5-74, 5-75
junipers, 1-5, 3-26, 3-30, 3-31, 3-65
Kofa Mountain barberry, 1-5, 3-65
Land use, authorizations (LUA), 2-19, 5-7
Listed species, see Threatened and endangered species (TES), 3-11
Maricopa County, 1-3, 1-5, 1-18, 2-29, 2-32, 2-33, 2-32, 3-2, 3-3, 3-5, 3-15, 3-18, 3-27, 3-28, 3-30, 3-42, 3-43, 3-46, 3-47, 3-48, 3-50, 3-52, 3-55, 3-57, 3-59, 3-60, 3-62, 3-66, 3-67, 3-68, 3-69, 3-73, 3-74, 3-75, 3-76, 3-82, 3-83, 4-7, 4-51, 4-55, 4-67, 4-89, 4-95, 4-103, 4-109, 4-110, 4-111, 4-114, 4-115, 4-116, 4-117, 4-119, 4-131, 4-134, 4-139, 5-2, 5-7, 5-9, 5-27, 5-31, 5-34, 5-52, 5-57, 5-58, 5-60, 5-61, 5-62, 5-63, 5-73
Monument objects, ES-1, ES-5, ES-8, 1-2, 1-8, 1-10, 1-13, 1-14, 1-15, 1-16, 2-1, 2-2, 2-6, 2-7, 2-9, 2-11, 2-12, 2-15, 2-17, 2-20, 2-21, 2-29, 2-34, 3-55, 3-56, 3-57, 3-64, 3-69, 4-14, 4-16, 4-17, 4-18, 4-19, 4-27, 4-56, 4-92, 4-102, 4-103, 4-122, 4-125, 4-126, 4-127, 5-14, 5-15, 5-16, 5-49, 5-57, 5-68, 5-69, 5-70, 5-75
National Ambient Air Quality Standards (NAAQS), 3-2, 3-3, 3-5, 4-6
National Environmental Policy Act of 1969 (NEPA), ES-1, 1-20
National Historic Trail (NHT), ES-8, 1-5, 1-19, 2-11, 2-14, 2-15, 2-21, 2-33, 2-35, 3-7, 3-50, 3-60, 3-66, 3-68, 3-69, 3-70, 4-11, 4-14, 4-16, 4-17, 4-18, 4-19, 4-41, 4-42, 4-54, 4-62, 4-63, 4-81, 4-85, 4-86, 4-87, 4-88, 4-89, 4-90, 4-91, 4-92, 4-93, 4-96, 4-97, 4-99, 4-101, 4-102, 4-103, 4-104, 4-105, 4-107, 4-108, 4-109, 4-112, 4-113, 4-115, 4-116, 4-119, 4-120, 4-125, 4-126, 4-140, 5-2, 5-12, 5-13, 5-14, 5-15, 5-16, 5-22, 5-23, 5-26, 5-30, 5-32, 5-33, 5-35, 5-44, 5-45, 5-47, 5-48, 5-49, 5-50, 5-51, 5-52, 5-53, 5-57, 5-59, 5-60, 5-61, 5-62, 5-63, 5-64, 5-65, 5-69, 5-70
National Park Service, 1-19, 2-11, 2-14, 2-21, 2-35, 3-7, 3-67, 3-69, 4-11, 4-18, 4-103, 4-122, 4-126, 5-16, 5-69, 6-2
National Register of Historic Places (NRHP), 1-20, 3-6, 4-10, 4-13, 4-15, 4-121
Nonattainment area, 3-3, 3-5, 4-7, 4-8, 5-9
Off-highway vehicle (OHV), 2-20, 3-22, 3-46, 3-49, 3-50, 3-52, 3-57, 3-59, 3-60, 3-61, 3-62, 3-69, 3-77, 3-80, 4-8, 4-9, 4-21, 4-84, 4-86, 4-98, 4-99, 4-106, 4-112, 4-134, 5-8, 5-9, 5-13, 5-27, 5-37, 5-42, 5-45, 5-60, 5-67
Ozone (O_3), 3-3, 3-5, 4-7
Pima County, 3-15, 3-27, 3-28, 3-74, 3-75, 3-76, 3-81, 3-82, 3-83, 4-131, 4-134, 5-2, 5-7, 5-9, 5-57, 5-73
Pinal County, 1-3, 1-7, 1-14, 1-18, 1-19, 3-3, 3-5, 3-15, 3-18, 3-27, 3-28, 3-46, 3-74, 3-75, 3-76, 3-82, 3-83, 4-7, 4-131, 4-134, 5-2, 5-7, 5-9, 5-57, 5-60, 5-73
Plants, invasive, 4-45, 4-50, 5-21, 5-22, 5-23, 5-29, 5-37
Particulate matter ($PM_{2.5}$), 2-20, 3-3, 3-5, 4-6, 4-7, 4-8, 5-10
Prescribed fire, 3-38
Priority wildlife, 2-21, 2-22, 2-32, 3-8, 3-14, 3-32, 4-19, 4-20, 4-22, 4-23, 4-27, 4-30, 4-32, 4-35, 4-36, 4-103, 5-2, 5-17, 5-18, 5-19, 5-20, 5-21, 5-22, 5-23, 5-24, 5-57, 6-9
Public access, 3-61, 3-62, 3-65, 4-71, 5-57
Range improvements, 2-29, 3-32, 3-46, 4-77, 4-79, 5-10, 5-20, 5-42
Recreational target shooting, ES-1, ES-2, ES-5, ES-6, ES-7, ES-8, 1-1, 1-2, 1-3, 1-8, 1-9, 1-10, 1-11, 1-12, 1-13, 1-14, 1-15, 1-16, 1-17, 1-18, 1-19, 1-22, 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, 2-7, 2-9, 2-11, 2-12, 2-14, 2-15, 2-17, 2-19, 2-20, 2-23, 2-24, 2-25, 2-25, 2-26, 2-27, 2-26, 2-27, 2-28, 2-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 2-32, 2-33, 2-32, 2-33, 2-34, 2-35, 2-36, 2-35, 2-36, 2-35, 2-36, 2-38, 3-1, 3-2, 3-3, 3-5, 3-7, 3-32, 3-42, 3-50, 3-52, 3-53, 3-55, 3-56, 3-57,

3-68, 3-72, 3-73, 3-74, 3-75, 3-77, 3-78, 3-79, 3-80, 4-2, 4-6, 4-7, 4-8, 4-9, 4-10, 4-12, 4-13, 4-14, 4-15, 4-16, 4-17, 4-18, 4-19, 4-20, 4-21, 4-22, 4-23, 4-24, 4-25, 4-26, 4-27, 4-28, 4-29, 4-30, 4-31, 4-32, 4-33, 4-34, 4-35, 4-36, 4-38, 4-39, 4-40, 4-41, 4-42, 4-43, 4-44, 4-45, 4-46, 4-47, 4-48, 4-49, 4-50, 4-51, 4-52, 4-53, 4-54, 4-55, 4-56, 4-57, 4-59, 4-60, 4-61, 4-62, 4-63, 4-64, 4-65, 4-66, 4-67, 4-68, 4-69, 4-70, 4-71, 4-72, 4-73, 4-74, 4-75, 4-76, 4-77, 4-78, 4-79, 4-80, 4-81, 4-82, 4-83, 4-84, 4-85, 4-86, 4-87, 4-88, 4-89, 4-90, 4-91, 4-92, 4-93, 4-94, 4-95, 4-96, 4-97, 4-98, 4-99, 4-100, 4-101, 4-102, 4-103, 4-105, 4-106, 4-107, 4-108, 4-109, 4-110, 4-111, 4-112, 4-113, 4-114, 4-115, 4-116, 4-117, 4-118, 4-119, 4-120, 4-122, 4-123, 4-124, 4-125, 4-126, 4-127, 4-128, 4-129, 4-130, 4-131, 4-132, 4-133, 4-134, 4-135, 4-136, 4-137, 4-138, 4-139, 4-140, 4-141, 4-142, 4-143, 4-144, 5-2, 5-8, 5-10, 5-11, 5-12, 5-14, 5-15, 5-16, 5-17, 5-18, 5-19, 5-20, 5-21, 5-22, 5-23, 5-24, 5-25, 5-26, 5-27, 5-28, 5-29, 5-30, 5-31, 5-32, 5-33, 5-34, 5-35, 5-36, 5-37, 5-38, 5-39, 5-40, 5-41, 5-42, 5-43, 5-44, 5-45, 5-46, 5-47, 5-48, 5-49, 5-50, 5-51, 5-52, 5-53, 5-54, 5-55, 5-56, 5-57, 5-59, 5-60, 5-61, 5-62, 5-63, 5-64, 5-65, 5-67, 5-68, 5-69, 5-70, 5-71, 5-72, 5-73, 5-74, 5-75, 5-76, 6-3, 6-7, 6-8, 6-9

Rights-of-way (ROW), ES-8, 2-9, 3-2, 3-11, 3-20, 3-59, 3-61, 4-80, 5-7, 5-9, 5-13, 5-19, 5-21, 5-22, 5-23, 5-24, 5-27, 5-31, 5-35, 5-36, 5-37, 5-38, 5-40, 5-41, 5-42, 5-60, 5-66

Saguaro cactus, 1-3, 1-8, 1-10, 1-14, 2-24, 2-25, 3-11, 3-16, 3-26, 3-29, 3-30, 3-55, 3-56, 3-64, 4-5, 4-27, 4-46, 4-47, 4-51, 4-52, 4-67, 4-103, 5-19, 5-28, 5-29, 5-57

Salt River Pima-Maricopa Indian Community, 1-7, 3-71, 3-84

SDNM Recreational Target Shooting Analysis, 2-9

Sensitive species, 3-8, 3-31

Socioeconomics, ES-5, 1-9, 2-37, 3-74, 3-76, 3-81, 3-82, 4-132, 4-134, 4-137, 4-142, 6-5, 6-6

Soils, 1-15, 2-23, 3-15, 3-18, 3-21, 3-22, 3-24, 3-28, 3-29, 3-62, 3-70, 3-73, 4-5, 4-14, 4-36, 4-37, 4-38, 4-39, 4-40, 4-41, 4-42, 4-43, 4-44, 4-45, 4-46, 4-58, 4-59, 4-103, 4-106, 5-24, 5-25, 5-26, 5-27, 5-57

Soils, fragile, 4-14, 4-123

Sonoran pronghorn, 2-22, 3-9, 3-11, 3-13, 3-66, 4-22, 4-25, 4-26, 4-30, 4-32, 4-34, 5-17, 5-20, 5-21, 5-22

Special Recreation Management Area (SRMA), 3-49

Special status plants, 2-24, 4-45, 4-46, 4-47, 4-48, 4-50, 4-52, 4-53, 4-55, 4-56, 5-27, 5-29, 5-30

Special status species, 1-10, 3-8, 3-66, 4-5, 4-45, 4-133

Surface water, 2-25, 4-42, 4-43, 4-57, 4-58, 4-59, 4-60, 4-61, 4-62, 4-63, 4-64

Tohono O'odham Nation, 1-7, 3-27, 3-71, 3-84, 6-7

Tohono O-odham Tribal Nation, 1-7, 3-27, 3-71, 3-84, 6-7

Travel management, 2-32, 3-34, 3-49, 3-59, 3-60, 4-17, 4-94, 4-97, 4-98, 4-99, 4-100, 4-101, 4-102, 5-24, 5-25, 5-31, 5-35, 5-37, 5-38, 5-39, 5-40, 5-41, 5-54, 5-55, 5-56

US Fish and Wildlife Service, 1-22, 3-10, 3-11, 3-13, 3-14, 3-15, 3-17, 3-52, 4-134, 6-7

Vegetation, wetlands, 3-15, 3-32

Vekol Valley, 2-20, 2-21, 2-36, 3-7, 3-15, 3-22, 3-29, 3-31, 3-32, 3-43, 3-46, 3-52, 3-55, 3-66, 4-8, 4-13, 4-16, 4-17, 4-22, 4-49, 4-50, 4-52, 4-53, 4-54, 4-55, 4-56, 4-79, 4-80, 4-81, 4-82, 4-83, 4-125, 4-129, 5-11, 5-14, 5-15, 5-18, 5-25, 5-29, 5-32

Water quality, 3-32, 4-58, 4-59

Water, groundwater, 3-32, 4-57

Water, surface water, 2-25, 4-42, 4-43, 4-57, 4-58, 4-59, 4-60, 4-61, 4-62, 4-63, 4-64

Watershed, 1-15, 3-31, 3-44, 4-57, 5-2, 5-4, 5-27, 5-31, 5-35

Wilderness, ES-7, ES-8, 1-1, 1-5, 1-20, 1-21, 2-14, 2-19, 2-21, 2-26, 2-29, 2-32, 2-33, 2-34, 3-32, 3-33, 3-34, 3-48, 3-50, 3-52, 3-55, 3-60, 3-62, 3-67, 3-68, 4-19, 4-42, 4-55, 4-64, 4-65, 4-66, 4-67, 4-89, 4-95, 4-103, 4-105, 4-108, 4-109, 4-110, 4-111, 4-114, 4-115, 4-116, 4-117, 4-119, 4-127, 4-139, 5-2, 5-16, 5-23, 5-26, 5-32, 5-33, 5-34, 5-50, 5-52, 5-57, 5-58, 5-61, 5-62, 5-63, 5-65, 5-70, 5-75, 6-8, 6-9

Wilderness Characteristics, ES-7, ES-8, 1-21, 2-2, 2-14, 2-19, 2-26, 2-31, 2-36, 2-37, 3-32, 3-33, 3-34, 3-68, 3-80, 4-2, 4-9, 4-18, 4-42, 4-54, 4-63, 4-64, 4-65, 4-66, 4-67, 4-68, 4-69, 4-70, 4-75, 4-81, 4-87, 4-88, 4-93, 4-94, 4-96,

4-97, 4-101, 4-102, 4-126, 4-130, 4-131, 4-137, 4-141, 5-2, 5-12, 5-16, 5-23, 5-26, 5-30, 5-32, 5-33, 5-34, 5-35, 5-45, 5-50, 5-53, 5-70, 5-72, 6-8, 6-9

Wildland Urban Interface (WUI), 3-38
Winter range, big game, 1-10, 3-17, 5-8

Appendix A
Sonoran Desert National Monument Presidential Proclamation

This page intentionally left blank.

APPENDIX A
SONORAN DESERT NATIONAL MONUMENT PRESIDENTIAL PROCLAMATION

SONORAN DESERT NATIONAL MONUMENT PROCLAMATION

Proclamation 7397 of January 17, 2001

Establishment of the Sonoran Desert National Monument

By the President of the United States of America.

A Proclamation

The Sonoran Desert National Monument is a magnificent example of untrammeled Sonoran desert landscape. The area encompasses a functioning desert ecosystem with an extraordinary array of biological, scientific, and historic resources. The most biologically diverse of the North American deserts, the Monument consists of distinct mountain ranges separated by wide valleys, and includes large saguaro cactus forest communities that provide excellent habitat for a wide range of wildlife species.

The Monument's biological resources include a spectacular diversity of plant and animal species. The higher peaks include unique woodland assemblages, while the lower elevation lands offer one of the most structurally complex examples of palo verde/mixed cacti association in the Sonoran Desert. The dense stands of leguminous trees and cacti are dominated by saguaros, palo verde trees, ironwood, prickly pear, and cholla. Important natural water holes, known as tinajas, exist throughout the Monument. The endangered acuna pineapple cactus is also found in the Monument.

The most striking aspect of the plant communities within the Monument are the abundant saguaro cactus forests. The saguaro is a signature plant of the Sonoran Desert. Individual saguaro plants are indeed magnificent, but a forest of these plants, together with the wide variety of trees, shrubs, and herbaceous plants that make up the forest community, is an impressive site to behold. The saguaro cactus forests within the Monument are a national treasure, rivaling those within the Saguaro National Park.

The rich diversity, density, and distribution of plants in the Sand Tank Mountains area of the Monument is especially striking and can be attributed to the management regime in place since the area was withdrawn for military purposes in 1941. In particular, while some public access to the area is allowed, no livestock grazing has occurred for nearly 50 years. To extend the extraordinary diversity and overall ecological health of the Sand Tank Mountains area, land adjacent and with biological resources similar to the area withdrawn for military purposes should be subject to a similar management regime to the fullest extent possible.

The Monument contains an abundance of packrat middens, allowing for scientific analysis of plant species and climates in past eras. Scientific analysis of the midden shows that the area received far more precipitation 20,000 years ago, and slowly became more arid. Vegetation for the area changed from juniper oak pinion pine woodland to the vegetation found today in the Sonoran Desert, although a few plants from the more mesic period, including the Kola Mountain barberry, Arizona rosewood, and junipers, remain on higher elevations of north facing slopes.

The lower elevations and flatter areas of the Monument contain the creosote bursage plant community. This plant community thrives in the open expanses between the mountain ranges, and connects the other plant communities together. Rare patches of desert grassland can also be found throughout the Monument, especially in the Sand Tank Mountains. The washes in the area support a much denser vegetation community than the surrounding desert, including mesquite, ironwood, paloverde, desert honeysuckle, chuperosa, and desert willow, as well as a variety of herbaceous plants. This vegetation offers the dense cover bird species need for successful nesting, foraging, and escape, and birds heavily use the washes during migration.

The diverse plant communities present in the Monument support a wide variety of wildlife, including the endangered Sonoran pronghorn, a robust population of desert bighorn sheep, especially in the Maricopa Mountains area, and other mammalian species such as mule deer, javelina, mountain lion, gray fox, and bobcat. Bat species within the Monument include the endangered lesser long nosed bat, the California leaf nosed bat, and the cave myotis. Over 200 species of birds are found in the Monument, including 59 species known to nest in the Vekol Valley area. Numerous species of raptors and owls inhabit the Monument, including the elf owl and the western screech owl. The Monument also supports a diverse array of reptiles and amphibians, including the Sonoran desert tortoise and the red backed whiptail. The Bureau of Land Management has designated approximately 25,000 acres of land in the Maricopa Mountains area as critical habitat for the desert tortoise. The Vekol Valley and Sand Tank Mountains contain especially diverse and robust populations of amphibians. During summer rainfall events, thousands of Sonoran green toads in the Vekol Valley can be heard moving around and calling out.

The Monument also contains many significant archaeological and historic sites, including rock art sites, lithic quarries, and scattered artifacts. Vekol Wash is believed to have been an important prehistoric travel and trade corridor between the Hohokam and tribes located in what is now Mexico. Signs of large villages and permanent habitat sites occur throughout the area, and particularly along the bajadas of the Table Top Mountains. Occupants of these villages were the ancestors of today's O'odham, Quechan, Cocopah, Maricopa, and other tribes. The Monument also contains a much used trail corridor 23 miles long in which are found remnants of several important historic trails, including the Juan Bautista de Anza National Historic Trail, the Mormon Battalion Trail, and the Butterfield Overland Stage Route.

Section 2 of the Act of June 8, 1906 (34 Stat. 225, 16 U.S.C. 431), authorizes the President, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national Monuments, and to reserve as a part thereof parcels of land, the limits of which in all cases shall be confined to the smallest area compatible with the proper care and management of the objects to be protected.

WHEREAS, it appears that it would be in the public interest to reserve such lands as a national Monument to be known as the Sonoran Desert National Monument.

NOW, THEREFORE, I, WILLIAM J. CLINTON, President of the United States of America, by the authority vested in me by section 2 of the Act of June 8, 1906 (34 Stat. 225, 16 U.S.C. 431), do proclaim that there are hereby set apart and reserved as the Sonoran Desert National Monument, for the purpose of protecting the objects identified above, all lands and interest in lands owned or controlled by the United States within the boundaries of the area described on the map entitled "Sonoran Desert National Monument" attached to and forming a part of this proclamation. The Federal land and interests in land reserved consist of approximately 486,149 acres, which is the smallest area compatible with the proper care and management of the objects to be protected.

For the purpose of protecting the objects identified above, all motorized and mechanized vehicle use off road will be prohibited, except for emergency or authorized administrative purposes. Nothing in this proclamation shall be deemed to enlarge or diminish the jurisdiction of the State of Arizona with respect to fish and wildlife management.

The establishment of this Monument is subject to valid existing rights.

All Federal lands and interests in lands within the boundaries of this Monument are hereby appropriated and withdrawn from all forms of entry, location, selection, sale, or leasing or other disposition under the public land laws, including but not limited to withdrawal from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing, other than by exchange that furthers the protective purposes of the Monument. Lands and interests in lands within the Monument not owned by the United States shall be reserved as a part of the Monument upon acquisition of title thereto by the United States.

This proclamation does not reserve water as a matter of Federal law nor relinquish any water rights held by the Federal Government existing on this date. The Federal land management agencies shall work with appropriate State authorities to ensure that water resources needed for Monument purposes are available.

The Secretary of the Interior shall manage the Monument through the Bureau of Land Management, pursuant to applicable legal authorities, to implement the purposes of this proclamation. That portion identified as Area A on the map, however, shall be managed under the management arrangement established by section 3 of Public Law No. 99 606, 100 Stat. 3460 61, until November 6, 2001, at which time, pursuant to section 5(a) of Public Law No. 99 606, 100 Stat. 3462 63, the military withdrawal terminates. At that time, the Secretary of the Interior shall assume management responsibility for Area A through the Bureau of Land Management.

The Secretary of the Interior shall prepare a management plan that addresses the actions, including road closures or travel restrictions, necessary to protect the objects identified in this proclamation. Laws, regulations, and policies followed by the Bureau of Land Management in issuing and administering grazing permits or leases on all lands under its jurisdiction shall continue to apply with regard to the lands in the Monument; provided, however, that grazing permits on Federal lands within the Monument south of Interstate Highway 8 shall not be renewed at the end of their current term; and provided further, that grazing on Federal lands north of Interstate 8 shall be allowed to continue only to the extent that the Bureau of Land Management determines that grazing is compatible with the paramount purpose of protecting the objects identified in this proclamation.

Nothing in this proclamation shall be deemed to revoke any existing withdrawal, reservation, or appropriation; however, the national Monument shall be the dominant reservation.

Nothing in this proclamation shall preclude low level overflights of military aircraft, the designation of new units of special use airspace, or the use or establishment of military flight training routes over the lands included in this proclamation.

In order to protect the public during operations at the adjacent Barry M. Goldwater Range, and to continue management practices that have resulted in an exceptionally well preserved natural resource, the current procedures for public access to the portion of the Monument depicted as Area A on the attached map shall remain in full force and effect, except to the extent that the United States Air Force agrees to different procedures which the Bureau of Land Management determines are compatible with the protection of the objects identified in this proclamation.

Warning is hereby given to all unauthorized persons not to appropriate, injure, destroy, or remove any feature of this Monument and not to locate or settle upon any of the lands thereof. IN WITNESS WHEREOF, I have hereunto set my hand this seventeenth day of January, in the year of our Lord two thousand one, and of the Independence of the United States of America the two hundred and twenty fifth.

WILLIAM J. CLINTON

Appendix B

Sonoran Desert National Monument Monitoring and Mitigation Protocol

This page intentionally left blank.

APPENDIX B
SONORAN DESERT NATIONAL MONUMENT MONITORING AND MITIGATION PROTOCOL

INTRODUCTION

During preparation of the Sonoran Desert National Monument (SDNM) Record of Decision (ROD) and Approved Resource Management Plan (2012), the BLM attempted to forecast the suitability of recreational target shooting with respect to impacts on Monument objects across the SDNM. The approach used in the ROD included inherent assumptions that disregarded site-specific levels of impacts and did not consider potential impacts on all objects identified in Presidential Proclamation 7397. For these reasons, the BLM has developed the following monitoring and mitigation protocol to assess and respond to impacts from recreation activities on Monument objects and to determine if such impacts conflict with the BLM's mandate to protect the objects of the SDNM.

Within the BLM's land use planning process, monitoring and mitigation plans typically occur at the "implementation level" and would not be included at the broader, landscape-scale "resource management plan" level represented by the SDNM Target Shooting RMPA/EIS (BLM Handbook H-1610-1). For this reason, the monitoring and mitigation protocol developed below is not a complete plan, but is presented as an initial framework – with specific examples – to illustrate how the subsequent, completed protocol would function in the protection of the SDNM's objects.

The goal of the SDNM Monitoring and Mitigation Protocol is to avoid and minimize recreation impacts on Monument objects consistent with Presidential Proclamation 7397 and the management objectives for each SDNM Recreation Management Zone (RMZ) as prescribed by the ROD. The management objectives for the two RMZ's within SDNM are as follows:

1. Juan Bautista de Anza National Historic Trail RMZ (Anza RMZ): Established to provide recreation and educational opportunities directed at visitors seeking to discover, tour, and learn about the

Juan Bautista de Anza National Historic Trail, Arizona history, and natural history of the Sonoran Desert.

2. Desert Back Country RMZ: Established to provide recreation opportunities for visitors seeking a remote, undeveloped, back country experience with resource-dependent activities such as hunting, camping, hiking, sightseeing, and four-wheel-drive touring.

Physical, social, and administrative settings were described for each RMZ to establish standards for the management of recreation impacts on objects of the SDNM, and a Limits of Acceptable Change (LAC) method of monitoring and responding to such impacts was prescribed in the 2012 ROD (BLM, 2012). Thus, this monitoring and mitigation protocol would assess, prevent, and respond to impacts resulting from all recreational activities occurring on the SDNM, including recreational target shooting.

Impacts on some Monument objects can be remediated through revegetation, clean-up efforts, or other methods. Impacts on other Monument objects, such as cultural resources, are considered non-remediable; thus this protocol seeks to avoid and prevent impacts on these objects.

Limits of Acceptable Change

Effective recreation planning and management is adaptive in nature and includes a careful blend of scientific data, visitor values, and management objectives ("carrying capacity framework") that is implemented through field monitoring and defined responses. Recreational opportunities are defined as specifically and quantitatively as possible through management objectives and their associated indicators, including standards of quality. Indicator variables are monitored in the field to determine if existing conditions meet defined standards of quality and management action is taken when and where monitoring suggests that standards of quality have been violated or are in danger of being violated (Manning, 2011). This process is known as "Limits of Acceptable Change" (Figure B-1).

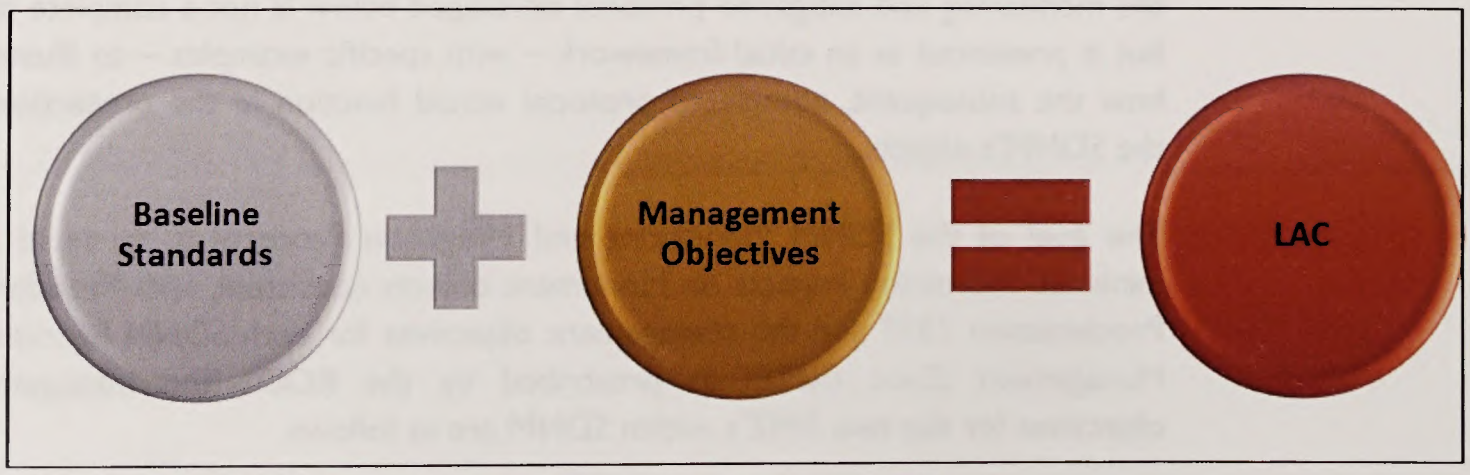


Figure B-1. Establishing a Limit of Acceptable Change (LAC).

SDNM Baseline Standard

Between 2003 and 2005 the BLM, in partnership with Northern Arizona University (NAU), inventoried all known sites on the SDNM used for recreational purposes (Foti and Chambers, 2005). The entire vehicle travel network was driven and at each location where evidence of recreation use was detected, a variety of variables were measured and recorded. Variables included the presence of rock fire rings, "barren core" areas, damage to trees, and damage to cactus. The survey documented 410 sites, and of these, 360 sites were located on BLM-administered land within the SDNM boundary. Due to the nearness of this inventory to the time of Monument designation in 2001, this recreation site inventory is the best available data on the condition of the SDNM at time of designation. This inventory serves as the BLM's baseline for the number and locations of recreational sites that existed at the time of Monument designation (Figure B-2).

SDNM Recreation Management Objectives

The two recreation management zones within SDNM: Anza RMZ, and the Desert Back Country RMZ were established with differing management goals to recognize and manage for distinct visitor opportunities. Each RMZ is comprised of three recreation settings – front country, passage, and back country – in varying area extents that further define and assist in the management of visitor opportunities afforded (Figure B-3). These settings establish the desired conditions for recreation resources for each RMZ. Management actions and allowable uses can only be allowed if they remain within the criteria identified within the setting prescriptions. These settings were established in the 2012 SDNM ROD and approved RMP. As described in this appendix, monitoring would be done within each setting area.

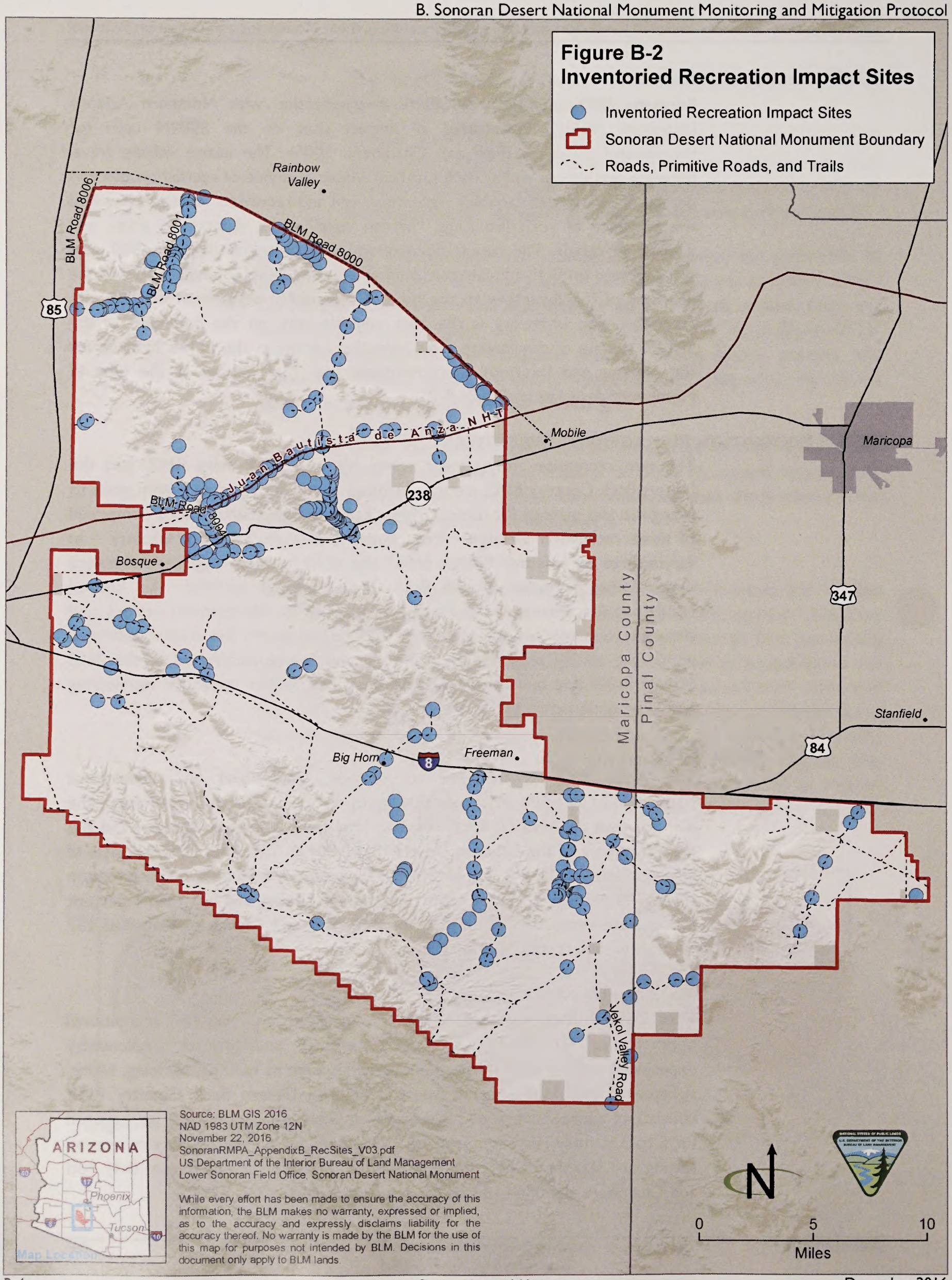
Anza RMZ

The Anza RMZ is managed to provide recreational and educational opportunities directed at visitors seeking to discover, tour, and learn about the Juan Bautista de Anza National Historic Trail (NHT), Arizona history, and the natural history of the Sonoran Desert (BLM, 2012). The Anza RMZ consists of approximately 52,800 acres, of which 55 percent is a backcountry recreation setting, 45 percent is a front country recreation setting, and less than 1 percent is a passage recreation setting (Figure B-4). Foti and Chambers identified 177 recreation impact sites in this RMZ.

Desert Back Country RMZ

The Desert Back Country RMZ is managed to provide recreational opportunities for visitors seeking a remote, undeveloped, backcountry experience with resource-dependent activities such as hunting, camping, hiking, sightseeing, and four-wheel drive touring. The Desert Back Country RMZ consists of approximately 433,600 acres, of which 88 percent will be managed for a backcountry recreation setting, 12 percent for a front country recreation setting, and less than 1 percent for a passage recreation setting (Figure B-4). Foti and Chambers identified 183 recreation impact sites in this RMZ.

Figure B-2
Inventoried Recreation Impact Sites



Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 22, 2016
SonoranRMPA_AppendixB_RecSites_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

Front Country Setting: Front Country offers intensive, resource-dependent recreational uses and facilities. The lands are generally natural in appearance and may see minor to moderate alterations over the life of the RMP due to land use authorizations and BLM management actions. Motorized and mechanized vehicles must remain on designated routes.

Physical Conditions

- **Remoteness** = Moderately remote, within a one- to two-hour drive from urban and rural communities.
- **Naturalness** = Mostly natural environment with low to high evidence of human changes at specific attractions.
- **Facilities** = The extent of developed user facilities will be low to high.

Social Conditions

- **Contacts** = Moderate to high level of interaction (average 25-75 individuals singly or in groups per day).
- **Group Size** = Generally the maximum group size would be up to 75 individuals, but groups of up to 200 may be encountered under permit.
- **Evidence of Use** = In local areas (1 acre or less), minor impacts on soil and vegetation persist from year to year.

Administrative Conditions

- **Mechanized Use** = Motorized and mechanized use on designated routes only.
- **Management Controls** = Moderate to high management presence.
- **Visitor Services** = Visitor information levels are moderate to high.

Passage Setting: Passage offers motorized travel corridors traversing the Back Country setting. In the SDNM, corridors are centered on a motorized travel route designated for public use, are 200 feet wide (100 feet each side), and are available for management infrastructure in response to resource concerns and visitor demand. The lands are generally natural in appearance and may see minor to moderate alterations over the life of the land use plan due to land use authorizations and BLM management actions.

Physical Conditions

- **Remoteness** = Remote setting, within a several-hour drive from communities to access areas.
- **Naturalness** = This zone is mostly natural with low to moderate evidence of human-induced change.
- **Facilities** = The degree of developed user facilities will be low to moderate.

Social Conditions

- **Contacts** = Generally the level of interaction among visitors is low (up to 25 individuals per day) but occasionally up to 150 individuals singly or in groups per day.
- **Group Size** = Generally up to 25-50 individuals with the occasional group size reaching 200 individuals.
- **Evidence of Use** = In local areas (1 acre or less), minor impacts on soil and vegetation persist from year to year.

Administrative Conditions

- **Mechanized Use** = Motorized and mechanized on designated routes.
- **Management Controls** = Low to moderate management presence.
- **Visitor Services** = Visitor information levels are low to moderate.

Back Country Setting: Back Country offers offering undeveloped, primitive, and self-directed visitor experiences that do not include provisions for motorized or mechanized access, except for identified routes.

Physical Conditions

- **Remoteness** = Area is remote and primitive.
- **Naturalness** = Predominantly natural environment of moderate to large size. Human modifications are occasionally evident, but not intrusive.
- **Facilities** = The degree of developed user facilities will be low to none.

Social Conditions

- **Contacts** = The level of interaction among visitors is low. Visitors encounter up to 25 individuals singly or in groups per day on designated trails or near community interface, front country, or passage settings and 10 or fewer individuals singly or in groups per day in more remote off-trail settings.
- **Group Size** = Generally, a maximum group size up to 50 individuals.
- **Evidence of Use** = Impacts on soil and vegetation recover yearly or are negligible in extent (0.1 acres or less).

Administrative Conditions

- **Mechanized Use** = Motorized use is not allowed. Mechanized use is allowed on designated trails.
- **Management Controls** = Low management presence.
- **Visitor Services** = Visitor information levels are low.

Figure B-3. Recreation setting conditions from the 2012 SDNM ROD.

Figure B-4
Desert Back County RMZ, Juan Bautista De Anza NHT RMZ, and Recreation Settings

- Desert Back Country Recreation Management Zone
- Juan Bautista de Anza NHT Recreation Management Zone
- Front Country Recreation Setting
- Passage Recreation Setting
- Back Country Recreation Setting
- Sonoran Desert National Monument Boundary
- Roads, Primitive Roads, and Trails

Rainbow Valley
BLM Road 8006
BLM Road 8001
BLM Road 8000
Desert Back Country RMZ
Juan Bautista de Anza NHT RMZ
Juan Bautista de Anza NHT
Mobile
Maricopa
BLM Road 8004
Bosque
Maricopa County
Pinal County
Stanfield
Big Horn
Freeman
Desert Back Country RMZ
Yekol Valley Road
85
238
8
84
347

ARIZONA
Phoenix
Tucson
Map Location

Source: BLM GIS 2016
NAD 1983 UTM Zone 12N
November 17, 2016
SonoranRMPA_AppendixB_RMZsRecSetting_V03.pdf
US Department of the Interior Bureau of Land Management
Lower Sonoran Field Office, Sonoran Desert National Monument

While every effort has been made to ensure the accuracy of this information, the BLM makes no warranty, expressed or implied, as to the accuracy and expressly disclaims liability for the accuracy thereof. No warranty is made by the BLM for the use of this map for purposes not intended by BLM. Decisions in this document only apply to BLM lands.

N

0 5 10
Miles

SDNM Limits of Acceptable Change

The baseline condition for the SDNM described above, combined with the standards of quality represented by the recreation settings established in the SDNM ROD, allow for development of a LAC method of managing the SDNM to protect Monument objects. The associated field monitoring protocol and management responses (mitigation measures) will assess and respond to field conditions on the SDNM related to the physical, social, and administrative parameters of the recreation settings (Figure B-5).

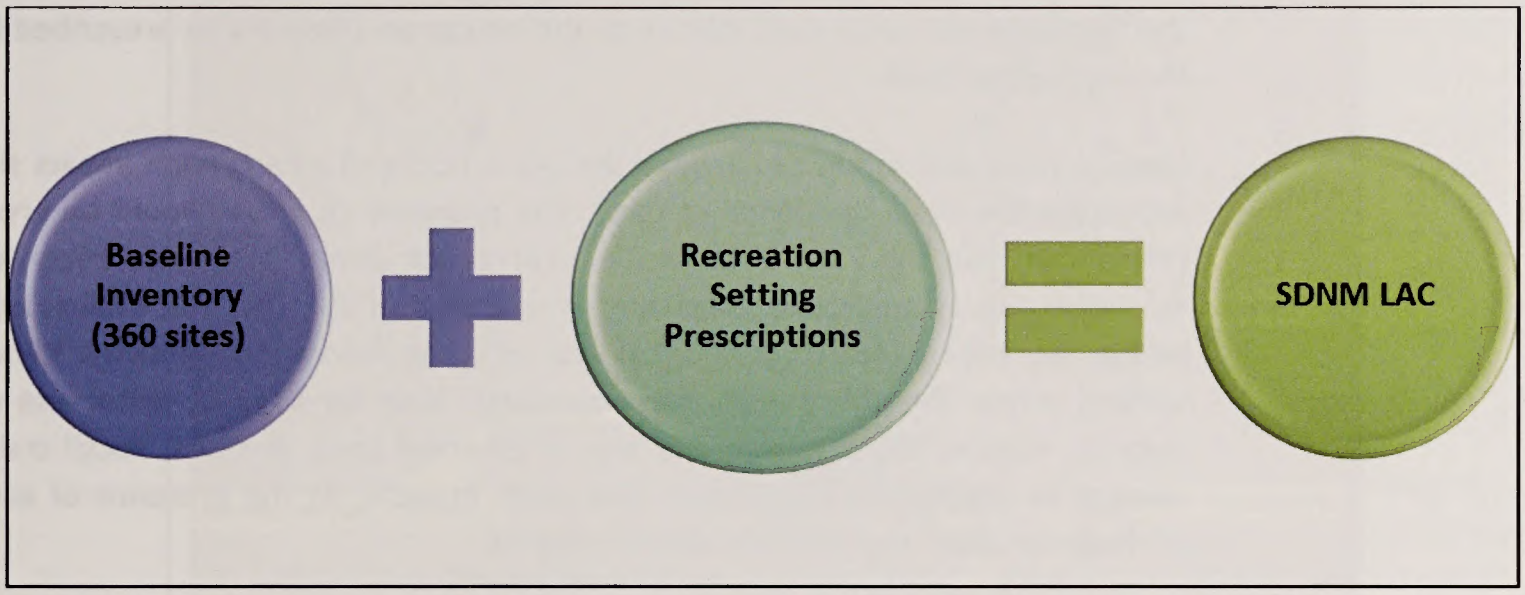


Figure B-5. Formula for SDNM Limits of Acceptable Change.

The baseline inventory of recreation sites present on the SDNM during 2003-2005, combined with the maximum allowable evidence of use per site provided by the SDNM ROD, suggest an appropriate maximum evidence of use observed in the field. For the Front Country Setting of the Anza RMZ, that total is 164 acres. Including acres for both the Passage and Back Country Settings, the total maximum recreation evidence of use across the entire Monument is 325.8 acres (Table B-1).

Table B-1
Maximum Allowable Evidence of Use (acres) by SDNM Recreation Management Zone and Setting

Management Zone & Setting	Total Sites	Maximum Allowable Evidence of Use per Site (acres)	Maximum Allowable Evidence of Use (acres)
Juan Bautista de Anza NHT RMZ			
Front Country	164	1.0	164.0
Passage	7	1.0	7.0
Back Country	6	0.1	0.6
Subtotal:	*177*		*171.6*
Desert Back Country RMZ			
Front Country	88	1.0	88.0
Passage	63	1.0	63.0
Back Country	32	0.1	3.2
Subtotal:	*183*		*154.2*
Total:	**360**		**325.8**

Physical Impact Monitoring

The standard of quality from the SDNM ROD prescribes that an individual site located in the Front Country or Passage Settings may not have an evidence of use perimeter exceeding one acre in extent, and in the Back Country Setting may not have an evidence of use perimeter exceeding one-tenth acre in extent. Other standards that may be developed for monitoring and response to physical impacts could include: 1) the risk that a specific site may reach these maximum standards in the future, 2) the occurrence of new sites, 3) the total number of sites present on the Monument, 4) the density of sites in a particular area, or 5) the aggregate size of all sites relative to the maximum allowable as prescribed by the setting standards.

Impacts observed within and around the barren core of a recreation impact site represent the site's "evidence of use." The presence of a site would be cross referenced with the 2003-2005 baseline recreation impact survey or recorded as a new site as applicable. Beginning at one end of the site, the evaluator(s) sweep the entire area to the logical end of most recreational activity. When walking across the entire area, the evaluator(s) look for signs of visitor use or impacts, such as the presence and size of a barren core, fire pits, social trails, damage to vegetation, solid waste, and other impacts. At the presence of each of these variables, the field evaluator(s) would:

1. Place one color pin flag on or near the edge of the impacted area to delineate the perimeter of the site (evidence of use)
2. Place a different color pin flag near the edge of the barren core area as they walk around
3. Place a different color pin flag on or near each of the impacts that are observed on the site. This would help keep a tally of the number of each of the critical impact variables that are encountered (Figure B-6).

When the evaluator(s) have concluded their sweep of the site, the evaluator(s) uses a GPS unit or tablet to complete the following:

1. Take a photo or video of the site, including all of the impacts
2. Create a polygon for the entire perimeter of the site
3. Create a polygon for the perimeter of the barren core of the site
4. Utilize a standard data schema to record the remaining physical impacts of the site
5. Calculate the area of the site

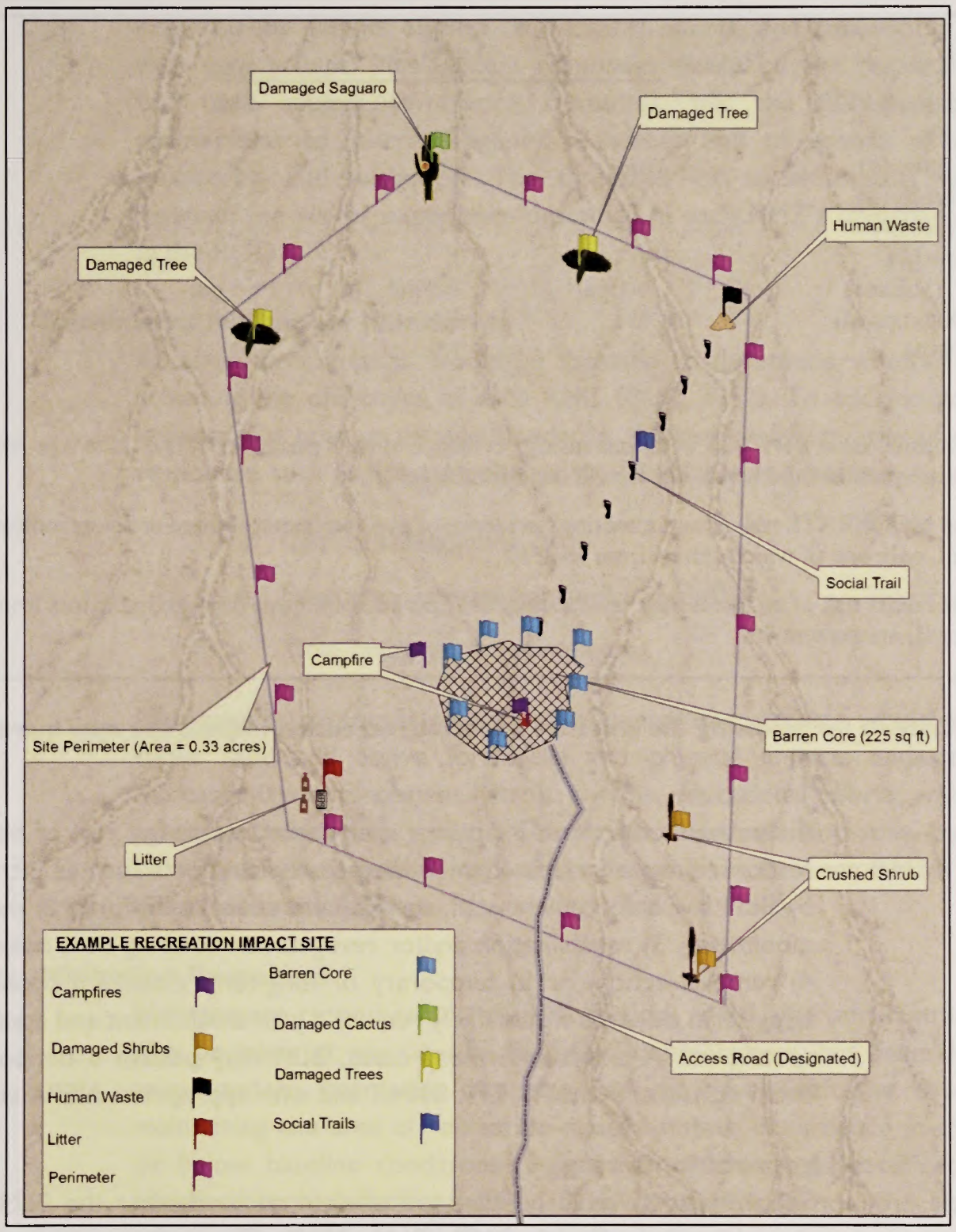


Figure B-6. Representation of field method to record impact site impact variables.

In addition to measuring the site perimeter/evidence of use, it is also important to measure the risk that a particular site may be in that would lead to the maximum allowed standard. This would allow the BLM to take action(s) to manage a site prior to becoming a more pressing management problem. A site may pose a risk of growing in size based upon the presence of impact indicators normally measured in the field and described above. For example, increased or heavy use of a site may cause noticeable impacts such as a larger barren core, presence of damage to vegetation, presence of multiple fire pits and social trails, and increased litter. These variables, assessed by levels of presence, provide clues as to the future direction of a site toward increased evidence of use. Figure B-7 presents a matrix of indicators and risk criteria that has been developed by the BLM to assess such risk at recreation sites on the SDNM.

Indicators	Level I	II	III
Barren Core (sq. ft.)	<200	201-500	>500
Campfires (#)	1	2	≥3
Damaged Cactus (#)	0	1	≥2
Damaged Shrubs (#)	0	1	≥2
Damaged Trees (#)	0	1	≥2
Human Waste (#)	0	1	≥2
Solid waste (volume)	<1 gal	1-5 gal	>5 gal
Damaged Outcrops (#)	0	1	≥2
Social Trails (#)	0	1	≥2

- A site is considered at LOW risk of an increasing "evidence of use" perimeter of use" if two or fewer indicators are present from levels I or II, and none from level III.
- A site is at MODERATE risk of an increasing "evidence of use" perimeter if three or fewer indicators are present, only one of which can be from level III.
- A site is at HIGH risk of an increasing "evidence of use" perimeter if three or more indicators from levels II or III are present.

Figure B-7. Criteria for assessing the risk that a specific recreation impact site may increase in evidence of use.

If thresholds for these indicators are reached or are at risk of being reached, responses might include: 1) increased custodial efforts such as increased patrol by BLM law enforcement staff, signage, and education efforts, 2) more frequent monitoring, 3) rehabilitation and/or revegetation to bring sites below standards, 4) removal action, or 5) temporary or long-term closure if problems persist. Long-term closures would likely require a plan amendment and appropriate site-specific NEPA analysis; in many cases, BLM may publish a temporary closure order consistent with 43 CFR 8364.1 and with appropriate NEPA compliance.

Social Impact Monitoring

Social impacts would be assessed to determine whether the BLM is achieving the objectives of each RMZ (BLM, 2012). To assess social impacts, visitor expectations and perceptions would be assessed, including safety, management effectiveness, and expectations of experience opportunities. Such information would be derived from:

- Responses from visitor satisfaction surveys
- Complaints from visitors
- Law enforcement incident reports
- Visitation numbers that directly correlate to user interactions (to ensure management to the levels identified in the ROD)

Management responses to mitigate social impacts would be similar to those described above for physical impacts and could include increased law

enforcement patrols, signage, educational efforts, and partnership agreements with user groups. Management responses would be the responsibility of the BLM and subject to agency resources, but the BLM would prioritize partnerships to leverage agency resources and to ensure effectiveness of monitoring and mitigation. The threshold for social impacts would be to maintain the visitor experience described in each RMZ's objective as discussed in the ROD.

Administrative Impact Monitoring

Administrative impacts would be assessed to determine whether the BLM is achieving the objectives of each RMZ (BLM, 2012). To address administrative impacts that near or exceed standards, the cost and frequency of management responses, such as site remediation, would be assessed from:

- Cost of remediation (site)
- Frequency of remediation (same site)
- Time taken to remediate (site)

Management responses to mitigate administrative impacts would be similar to those described above for social and physical impacts and could include increased law enforcement patrols, signage, educational efforts, and partnership agreements with user groups. The threshold for administrative impacts would be to maintain the visitor experience described in the each RMZ's objective as discussed in the ROD.

Mitigation Responses

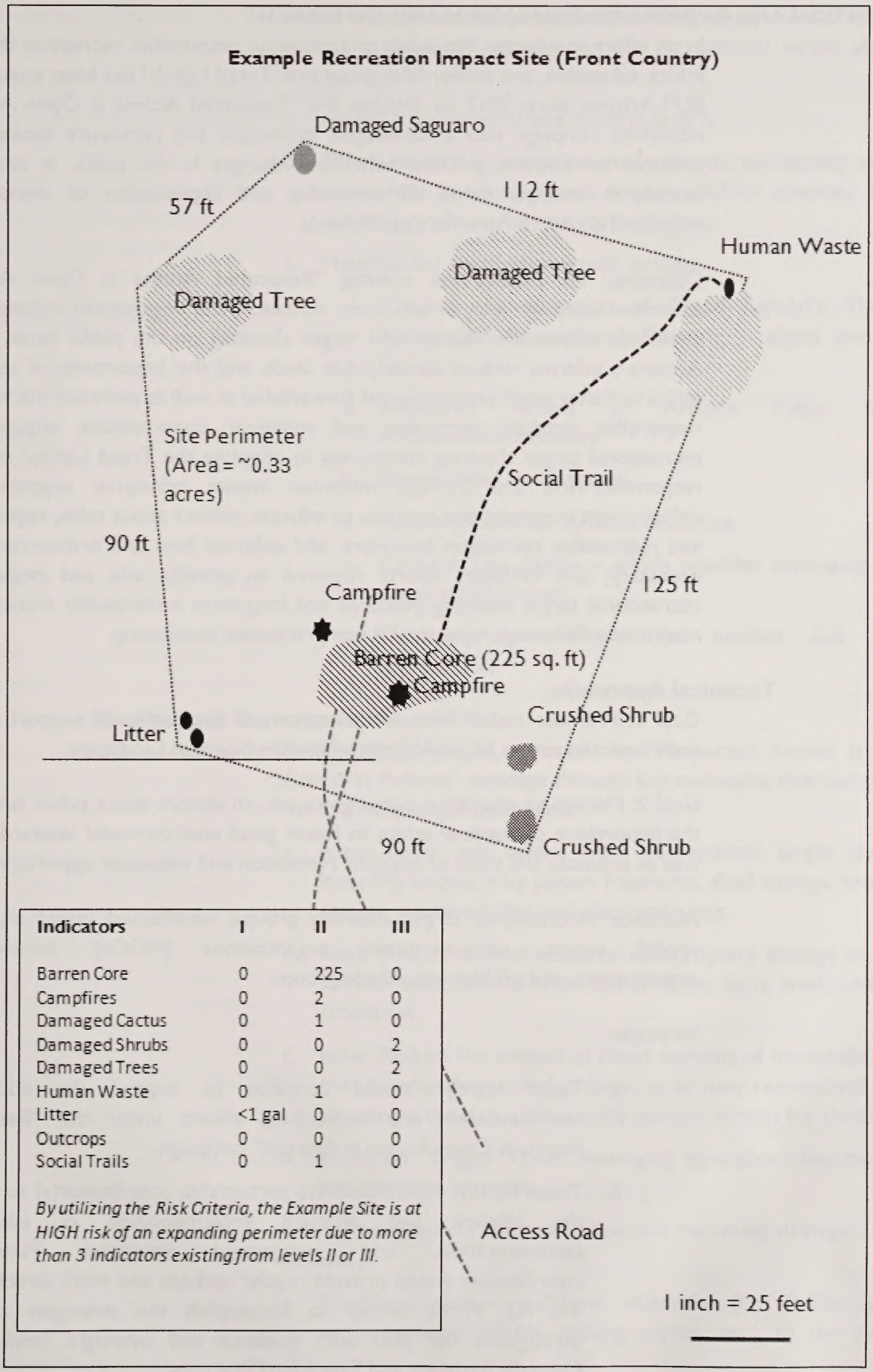
Management responses to mitigate physical, social, and administrative impacts may be taken at any time by BLM staff or volunteers, but generally would be prioritized by recreation site size and risk level with the overall goal of maintaining the area of recreation-related surface disturbance in the SDNM at or below baseline conditions (Figure B-8). Such mitigation efforts would be expected to be effective within 12 to 24 months; if not, the site would be advanced to the next higher risk level for increased mitigation response. Additionally, mitigation may be enacted to consider the cumulative combination of physical, social, and administrative impacts present across the SDNM, or in the presence of non-remediable impacts (such as cultural resources and tribally important places and resources). Such non-remediable impacts would lead to immediate closure of a site to any recreation activities. The BLM would seek to avoid these types of non-remediable impacts via increased monitoring and avoidance measures for sites in close proximity to known cultural resources. If tribal consultation results in identification of species and locations of plants collected for seasonal tribal food sources, the BLM would implement avoidance and mitigation measures, possibly including temporary or long-term closures, to protect these resources.

Site Rating	Example Mitigation Measures
Within Standards, Low Risk Goal: Maintain the site	• Routine monitoring • Routine BLM staff maintenance / custodial efforts • Routine BLM law enforcement patrols • Routine preventative education and outreach measures
Within Standards, Moderate Risk Goal: Maintain the site or reduce to a site rating of Low	• Increase frequency of site monitoring • Increase BLM staff maintenance / custodial efforts • Increase BLM law enforcement patrols • Institute site specific preventative education and outreach measures • Sponsor site maintenance projects – BLM staff and/or volunteers: o Revegetation o Raking out trails o Scattering of rock fire rings o Remove evidence of use from rock outcrops o Place natural rock barriers
Within Standards, High Risk Goal: Reduce site rating to Moderate or below	• Increase frequency of site monitoring • Increase BLM staff maintenance / custodial efforts • Increase BLM law enforcement patrols • Institute site specific preventative education and outreach measures • Sponsor site maintenance projects – BLM staff and/or volunteers: o Revegetation o Raking out trails o Scattering of rock fire rings o Remove evidence of use from rock outcrops o Place natural rock barriers • Implement temporary site closure until remediation completed and site rating is reduced o Sign the site notifying the public of temporary closure o Place cement barriers or natural barriers to prevent access
Exceeds Standards Goal: Remediate to below maximum standard or close to use	• Implement removal action of solid waste until site no longer exceeds standards • Implement removal action of impacted soil until site no longer exceeds standards • Implement temporary site closure until remediation is completed and site no longer exceeds standards • Determine potential need for long-term site closure / analyze through NEPA process

Figure B-8. Example hierarchy of mitigation responses by LAC standards and risk levels.

Example of Monitoring and Evaluation of Site Specific Physical Impacts

The following example (Figure B-9) describes a recreation site that is within a Front Country setting and illustrates the application of the monitoring and risk assessment protocols described above. The site has a total evidence of use of 0.33 acres and is within the maximum allowable standard; however, the combination of impact variables recorded in the field indicates that the site is at high risk of increasing in size. This situation calls for a management response to educate the visiting public about the possibility that the site may not continue to be available in the future if the trend toward increased evidence of use is not reversed. Such responses may include increased patrols, remediation of a fire ring and the social trail, and signing advising of the importance of not damaging native vegetation.



Indicators	I	II	III
Barren Core	0	225	0
Campfires	0	2	0
Damaged Cactus	0	1	0
Damaged Shrubs	0	0	2
Damaged Trees	0	0	2
Human Waste	0	1	0
Litter	<1 gal	0	0
Outcrops	0	0	0
Social Trails	0	1	0

By utilizing the Risk Criteria, the Example Site is at HIGH risk of an expanding perimeter due to more than 3 indicators existing from levels II or III.

Figure B-9. Example recreation site monitoring and risk assessment.

PREVENTION AND AVOIDANCE: EDUCATION AND OUTREACH

In an effort to educate the public and promote responsible recreation through ethics, education, and stewardship programs, Tread Lightly! has been engaged by BLM-Arizona since 2012 to develop the "Respected Access is Open Access" education campaign into a full-fledged, systematic and persuasive stewardship initiative to motivate positive behavioral changes in the public in order to develop a stronger sense of ownership and appreciation of shared and respected access to America's public lands.

Objective: To expand the existing "Respected Access is Open Access" education campaign into an education, outreach, and engagement initiative that promotes responsible recreational target shooting on the public lands across Arizona , informs visitors about public lands and the importance of outdoor ethics to foster good environmental stewardship as well as promote the value of responsible outdoor recreation and volunteer opportunities; engages the recreational target shooting community in adopting the Tread Lightly! ethic of responsible use and through minimum impact principles; supports law enforcement programs and services to educate visitors about rules, regulations, and responsible recreation behaviors, and enforces laws and ordinances when necessary; and evaluates efforts required to provide safe and responsible recreational target shooting practices and long-term sustainability through site monitoring, follow-up reports, and comprehensive monitoring.

Technical Approach:

Goal 1: Promote stakeholder collaboration and ownership to support shared and respected access to public lands within the Sonoran Landscape.

Goal 2: Manage an education campaign to inform visitors about public lands and the importance of outdoor ethics to foster good environmental stewardship as well as promote the value of outdoor recreation and volunteer opportunities.

Audience: Recreational target shooting groups, un-affiliated target shooters, special events, nongovernment organizations (NGOs), conservation organizations, and off-highway vehicle groups.

Strategies:

1. Tread Lightly! would continue to expand the education, communication and stewardship efforts under the "Respected Access is Open Access in Arizona" campaign.
2. Tread Lightly! would dedicate partnership coordinator(s) to ensure the efficient and effective implementation of education, communication, and engagement strategies. Partnership coordinators would provide regular updates and work directly with the AZ Work Group to accomplish the strategies outlined throughout the plan with guidance and oversight from Tread Lightly!'s Assistant and Executive Directors.

3. Tread Lightly! would promote the "Respected Access is Open Access in Arizona" message to the recreational target shooting community.
    a. Attend a minimum of one event quarterly.
    b. Distribute ethics education materials to community outlets, particularly, shooting sports retailers, indoor shooting ranges, sporting goods stores, and visitor centers.
    c. Materials for distribution would include:
        i. Graphic representation of Tread Lightly!'s Tips for Responsible Recreational Shooting – digital and print format.
        ii. Respected Access in Arizona Public Service Announcement Posters.
        iii. Responsible Use Hangtags.
        iv. Where to Shoot in Arizona Brochure.
        v. Counter Top display – which provides messaging and a presentation format.
        vi. Outdoor signs/ Kiosks (as needed and where appropriate).

Marketing & Communications

1. Tread Lightly! would promote the "Respected Access is Open Access in Arizona" message through key messaging directed toward the following target behaviors:
    a. Issue: Litter left behind from recreational target shooting including targets, clay pigeon fragments, shell casings, improper targets, shattered glass and electronics, etc.
    b. Issue: Reduce natural resource and property damage to trees, shrubs, cacti, cultural sites and artifacts, signs, trash cans, and structures.
    c. Issue: Reduce the amount of illegal dumping of household waste (furniture/appliances and garbage) at or near recreational target shooting areas that subsequently become targets for shooting.
    d. Focus on "Trigger Trash" messaging throughout key messages and campaign materials.
2. Internal/Inter-agency communication and marketing strategies would include:
    a. Provide campaign collateral materials (i.e. Public Service announcements (PSA)s, talking points, etc.) to the Arizona

Workgroup partners for integration into agency communication materials.

b. Work directly with agency Public Information Officers (PIO)s on quarterly updates and coordinated communication and media outreach.

c. Provide a communications calendar that would include social media efforts/messages, as well as scheduled media efforts in support of campaign education, outreach and stewardship strategies.

d. Quarterly Arizona Work Group updates via conference call, meeting, or email update.

3. External Communications and Marketing strategies would include:

a. Engage recreational shooters in the ACT pledge: Be Accountable, Clean up after yourself, Tread Lightly! on Public Land.

b. Content Creation

i. Website – OpenAccessArizona.org or respectedaccessarizona.org

ii. Press Releases/Community Communications – quarterly press releases with an ethics tip to keep campaign on public's radar

iii. Editorial Coverage – Highlight campaign efforts through interviews with local and regional media sources, outdoor shows, and industry supporters.

iv. Public Service Announcement Placement – Examples of these publications are: Arizona Wildlife Views, wildlife guidebooks, BLM and Forest Service agency maps and laws and rules highlights, Arizona Travel Council publications, Forest Service publications, gun and shooting magazines, High Country News, New Times.

1. Distribute the PSA's in poster format to local retailers where guns and ammunition are sold.

v. Outdoor Billboards

1. Priority locations include:

a. Near retail outlets in the Phoenix area including Cabela's, Bass Pro, Walmart, Sportsman's Warehouse.

b. Access points to heavily used recreational target shooting areas including the Sonoran Desert National Monument and outlets along

Interstate 17, Interstate 8 and other priority areas as funding allows.

vi. Brand Awareness – Decals, t-shirts, hats, pins and bumper stickers to further boost visibility of the campaign.

vii. Promotional Video - Series publicized on YouTube, Social Media outlets, and via retail outlets

viii. Social Media – Create and Maintain social media platforms for the campaign

1. Focus on building grassroots support and utilize support network to distribute educational messages, recruit volunteers and share land management alerts (i.e. fire restrictions, seasonal restrictions, etc.)

2. Share and Tag posts with community/stakeholder groups

ix. Online Marketing - Placement (paid and/or pro bono) of campaign messaging via online portals, including:

1. Enthusiast forums

2. Agency Partner sites

a. Recreational Shooting, maps and information

c. Communications Tactical Plan

i. Create communication calendar (6 month time span) to include social media messages, press releases, and campaign promotion timeline in support of campaign strategies

d. Community Communications

i. Continue to build the campaign email database via the campaign website and sign up lists from outreach events

ii. Send Monthly updates to email database to provide engagement opportunities and keep the recreation community apprised of campaign efforts

iii. Cultivate relationships with local groups and provide quarterly updates for send out to membership/followers/members

Stakeholder & Community Engagement

1. Tread Lightly! would continue engagement with key community/stakeholder groups in the education, outreach, and stewardship strategies

a. Build list of stakeholder contacts

i. Enthusiast/User Groups

ii. Environmental/Resource Protection Groups

iii. Non-profit/community orgs

b. Coordinate an annual meeting to discuss accomplishments, provide resources, and discuss issues and strategies regarding natural resource protection and community engagement.

i. Coordinate annual meeting with Stakeholders.

1. Provide campaign updates

2. Address any additional issues and target locations for strategies

3. Engage partners in implementation strategies

c. Provide campaign collateral material for integration into stakeholder groups existing efforts.

2. Engage a minimum of 500 volunteers in stewardship activities annually, focused on recreational target shooting locations on public lands that have been adversely affected by irresponsible recreational target shooting practices.

a. Adopt a Desert – Provide stewardship project guidelines, marketing support, volunteer recruitment, and financial support to encourage stewardship of public lands areas popular to recreational shooters through sponsorships. Local groups are a strong stakeholder critical in ensuring stewardship of favorite recreational spots.

b. $500-$2000 sponsorships for supplies

3. Collaboration with existing community enthusiast groups regarding ethical recreation use to fully immerse the Respected Access messaging throughout the recreation community.

a. Arizona Off-Highway Vehicle Ambassador Program

b. Rio Salado Sportsmen's Club

c. Wildlife for Tomorrow

d. Priority stakeholders would include:

i. Groups that work with recreational shooters

ii. Sportsman Groups

iii. Groups that engage youth in outdoor recreation

iv. Groups with a Stewardship focus

4. Tread Lightly! would work to leverage agency partner funding with private partner funding to expand education, marketing and stewardship efforts while establishing a model public/private partnership model.

Enforcement

1. Coordinate with agency partners to implement routine patrols to educate users about the impacts of resource damage and promote responsible recreational target shooting at identified "concentrated use" areas.
2. Engage LEO's in tracking/monitoring dispersed recreational target shooting locations on public lands
   a. AZGFD would coordinate with BLM and Forest Service
   b. Analyze reporting data and citation data semi-annually
      i. Identify areas in need of education, outreach, signage
      ii. Track changes in citations and reports over time

Evaluation

1. Tread Lightly! would provide the BLM support in user monitoring, evaluation of education and outreach efforts and natural resource monitoring as needed.
   a. Work with the BLM to implement resource monitoring of dispersed recreational target shooting sites on the Sonoran Desert National Monument
   b. Establish evaluation of attitudes and behaviors associated with the Respected Access is Open Access in Arizona campaign to assess public awareness of the campaign messages and issues the campaign is designed to address.
      i. Identify success indicators
      ii. Track success indicators
      iii. Communicate results and adjust

Measures

- Develop messaging such as posters, public service announcement, purchase of key internet search words etc. to bring awareness to the campaign and address the issues related to responsible recreational target shooting on public lands
- The number of public service announcements, brochures, videos, and other marketing materials that were cooperatively developed to promote the campaign's key messages

- The number of social media posts the campaign partners promote on their various platforms, and the resulting number of shares, likes, etc.
- The number of stewardship volunteer projects, educational efforts, and other public outreach events held that integrate the campaign's key messages and the number of individuals, including youth, who participated in each event
- The number of free and paid advertisements of campaign materials placed in local, regional, national, and international online and print media outlets
- The total number of visitors to the Respected Access Arizona website
- The number of trailheads, visitor centers, interpretive exhibits, and other recreational facilities where campaign materials were promoted
- The estimated number of individuals who saw campaign materials through all efforts

GLOSSARY OF TERMS

Back Country Setting: Areas offering undeveloped, primitive, and self-directed visitor experiences that do not include provisions for motorized or mechanized access, except for identified routes.

Barren Core: A hardened area with compacted soil and void of vegetation.

Front Country Setting: Areas offering locations for intensive, resource-dependent recreation uses and facilities. Motorized and mechanized vehicles must remain on existing or designated routes. The lands are generally natural in appearance and may see minor to moderate alterations over the life of the land use plan due to land use authorizations and BLM management actions.

Monitoring: The periodic observation and orderly collection of information to determine: 1) the effects of resource management actions and allowable uses by tracking changing resource trends, needs, and conditions; and 2) the effectiveness of actions in meeting management objectives.

Passage Setting: Areas offering motorized travel corridors traversing the Back Country setting. In the SDNM, corridors are centered on a motorized travel route designated for public use, are 200 feet wide (100 feet each side), and are available for management infrastructure in response to resource concerns and visitor demand. The lands are generally natural in appearance and may see minor to moderate alterations over the life of the land use plan due to land use authorizations and BLM management actions.

Recreation Experiences: Psychological outcomes realized either by recreation-tourism participants as a direct result of their onsite leisure engagements and recreation-tourism activity participation or by non-participating community residents as a result of their interaction with visitors and guests within their community and/or interaction with the BLM and other public and private recreation-tourism providers and their actions.

Recreation Management Zones (RMZs): Sub-units within a Special Recreation Management Area or Extensive Recreation Area managed for distinctly different recreation products. Recreation products are comprised of recreation opportunities, the natural resource and community settings within which they occur, and the administrative and service environment created by affection recreation-tourism providers, within which recreation participation occurs.

This page intentionally left blank.

BLM Library
Denver Federal Center
Bldg. 50, OC-521
P.O. Box 25047
Denver, CO 80225

